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FIRST AERO WEEKLY IN THE WORLD

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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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Looking Forward

THE new year is usually regarded as a time for good resolutions, and a cynic has said that of such is composed the road to the nether regions. Doubtless the League of Nations is now engaged in the process of making its resolutions, and we hope for them a more celestial destiny. *Flight* would express hopes rather than resolutions, and the greatest hope is for peace in Africa and in Europe—to say nothing of Eastern Asia. Everyone wishes for an ending of the war in Abyssinia, and not least among those who hope for it are the parents and relations of the Italian soldiers. Britain hates war, even though she be not engaged in it herself. What we Britons want is a period of peace in which we can make progress with the building-up of our Air Force to a level which will make war more unlikely in the future. To have to, so to speak, clear for action at a time when we need all our energies for the complicated business of expanding and organising the expansion is a most undesired complication.

During the past year we have witnessed new squadrons being formed and new stations opened, and the squadrons have had to be moved from one station to another until it has been a difficult task to keep track of them all. During the coming year we hope to see everything arranged and in order, and the new squadrons left free to settle down to learn their duties. Many squadrons, also, will need leisure to get used to flying new types of machines. During the coming year there must be much experiment with those new types. It has yet to be discovered what are the most effective tactics of a heavily armed fighter flying at some 300 m.p.h. when it sights a formation of enemy bombers. It will doubtless be able to bring them to an engagement, but what next? Will it have to throttle down as it manœuvres round them, or will it trust mainly to its weight of fire to settle the matter in a few seconds? These are interesting problems.

There will also be interesting problems for the new, speedy medium bombers to solve, and the solution can only come from repeated practice and study of that practice. Will the high-flying raid or the low-flying raid prove the most effective? In our Air Exercises hitherto the high-flying raid has been favoured, trusting mainly to clouds to defeat the searchlights and the guns. The low-flying raid would seem to throw both guns and searchlights out of action whether there are clouds or not. It is, however, a somewhat risky matter to try out in peace time.

Overseas Needs

In the Overseas Commands there will have to be changes. It depends to a great extent on the result of the present war whether we shall have to introduce the novelty of sending fighter squadrons to any of those Commands. Hitherto there has been no need for fighters anywhere but in A.D.G.B. and in the Fleet Air Arm. Certainly the Overseas Commands ought to have their strength in flying boats increased. At Singapore and at Basra the squadrons now have the Singapore III boat, and the squadron at Malta, which is to be moved elsewhere, has the Scapa, but there ought to be more flying boat squadrons. In the Coastal Area the time-honoured Southampton still persists, and we want to see it make way for, say, the Stranraer. The Saro London seems eminently suitable for Empire work.

The prospects of commercial flying on the Empire routes are distinctly good, though they may not come to fruition in 1936. Still, when sound plans are being worked upon we have no cause to complain. This, too, can be said of the proposed air services across the Atlantic and Pacific Oceans, the inauguration of which promises to erect the greatest milestone in the history of commercial flying. Already the idea has captured the imagination of thousands for whom the science of aeronautics is still a closed book.

As for internal air lines, there still seems to be confusion and an obscure future. That future really de-

pends on the Post Office, which has it in its power to grant prosperity to one route and to withhold it from another. Feeder lines to connect with the overseas services may also have a future, but the routes need careful selection if they are to show a substantial advantage over rail transport. Fortunately, thanks to the late Postmaster-General, Sir Kingsley Wood, our inland mails are now carried by air wherever the aeroplane can show an advantage over rail and steamer, and it would be avaricious to ask for more than that. Even night flying inside the British Isles can hardly alter the situation, though it will have a very important bearing on the time taken over the long Empire routes.

The Technical Outlook

IT is natural at this time of the year to take stock of our present knowledge and to attempt to estimate from that what the immediate future is likely to have in store. The year which has just closed brought a good deal of technical progress, and at present the aeronautical technician is at a very interesting stage in his career. He is faced with many problems and difficulties, but we do not doubt that he will solve them in good time.

The expansion of the R.A.F. has brought with it the task of suddenly accelerated production. Every firm in the country is busy on orders for military aircraft, and it so happens that this demand for quantity production coincides with one of the periods of fundamental changes in structural design which have occurred from time to time since flying first began.

Some eight or ten years ago the British aircraft industry went through one such period. That was when the Air Ministry intimated to constructors that within a year or two all-metal construction of military aircraft would be required. The firms got to work, and in time each discovered ways and means of forming flat steel strip into corrugated sections which would develop something approaching the full strength of the material. That form of construction has served us well, and will continue to be used in the future. But a newer type, known as metal-clad or "stressed skin" construction, is now forging ahead and demanding the attention of designers. In its way it presents problems even more difficult than the early metal girder, mainly because hitherto it has not been found possible to find a simple way of calculating accurately the strength of a reinforced skin structure. The New Year will see much work done in this direction, and one may hope that in a twelvemonth we shall have accumulated a good deal of valuable experience.

New materials may be introduced which will enable the structure weight of aircraft to be cut down, but in military types, at any rate, the percentage of weight over which the designer has any control is getting very small, and too much should not be expected.

PANORAMA OF THE PYRAMIDS. Many aerial photographs of the Pyramids have been taken and published, but there is novelty in the extensive view shown in the above picture, taken from one of the bomber-transport machines of No. 216 (B.T.) Squadron, which is stationed at Heliopolis. The whole array of Pyramids is seen, while the arrow points out the location of the Sphinx. The recent excavations round the base of that mysterious monument can be discerned. The considerable town in the neighbourhood is also interesting.

The Outlook

A Running Commentary on Air Topics

Perhaps Not So Black . . .

THE serious student of aerodynamics will find food for thought in the article on stalling of tapered wings by Dr. Lachmann, chief designer to Handley Page, Ltd., published on pp. 10-13 of this week's issue of *Flight*. The author points out that, according to aerodynamic theory, a wing of rectangular plan form stalls first at the centre; the wing of elliptic plan form stalls simultaneously over the whole span; tapered wings stall first at the tips, the greater the taper the greater the difference in actual, as distinct from apparent, angle of incidence at the tips and in the centre.

A tapered wing is more efficient than a rectangular from the point of view of weight, hence the urge in modern design to use it. But the tendency to "drop a wing" when flying at or near the stalling angle may become so pronounced that it may outweigh other considerations. As was, perhaps, to be expected, Dr. Lachmann calls attention to the remedy. The combination of a partial flap and wing-tip slots is shown by him to be very effective, giving not only a high maximum lift coefficient due to the favourable lift coefficient distribution, but also a good margin for damping in roll.

It should be pointed out that although Dr. Lachmann's arguments are scarcely open to challenge, the behaviour of the tapered wing may not be quite so black as a study of the article might lead one to believe. The question of wing loading enters into the argument to a considerable extent, quantitatively if not qualitatively. Machines *have* been built with tapered wings which are remarkably docile at the stall, and it is possible to incorporate features in the general design of a machine which will mitigate very materially any tendency to "drop a wing." Nevertheless, it is very desirable that the characteristics of tapered wings should be known and understood, and for that reason we believe our readers will welcome Dr. Lachmann's article.

Rotating Wings

AFTER a lull of many months there is activity once more in the camp of the helicopterists. This time it is a French constructor who has focused attention on the possibilities of direct-lift flight. M. Louis Breguet, who is one of the pioneers of aviation, having been among the very first to design and build aeroplanes, was attracted to the helicopter idea in the very early days of flying, and there is thus poetic justice in the fact that a machine built by his firm should in modern times achieve a considerable measure of success, having recently, as recorded elsewhere in this issue, flown at a horizontal speed of more than sixty miles per hour; this followed upon an earlier success in which the machine covered a close circuit of 500 metres.

It may well be argued that neither of these two figures is very impressive. Compared with the aeroplane, which has had a quarter of a century of development, that is true. But let it be remembered that, for one thing, the Breguet-Dorand Gyroplane is still in a very experimental stage. That alone is sufficient to account for the modest figures. But on top of that one has the very important fact that the art of piloting a helicopter is still one that has to be learned.

Perhaps the promising results which have been attained with the French machine may lead to a real start being made in this country with the construction of the Asboth helicopter, which was described in *Flight* of March 21, 1935, and which resembles in general principle, if not in details, the Breguet-Dorand.

Pioneering in Persia

IT may be remembered that a few weeks ago there appeared in *Flight*, under the "Twenty-five Years Ago" heading, a note on the first aeroplane to be bought for purely commercial use—a Blériot monoplane (50 h.p. Gnome) sent out to Persia to the order of an English oil engineer.

A reader has now shed further light on the distinguished, if brief, life of this pioneer of commercial aircraft. He sends a copy of *The Naft*, the Anglo-Persion Oil Company's magazine, which has dug up the whole story from the sands of the desert, so to speak. Apparently the late Mr. Charles Ritchie, the engineer who directed the construction of the first pipe-line in Persia, became convinced, even at this early date—only eighteen months after Blériot flew the Channel—of the potentialities of the aeroplane in connection with his work. He therefore asked Mr. (now Air Commodore) J. G. Weir, of the well-known Glasgow firm of engineers, who was at that time learning to fly as Blériot's first pupil at Hendon, to send him out a machine. The only flying which he (Mr. Ritchie) had even seen was a display by Paulhan at Sandown Park, but when the new Blériot arrived he straightway set out to teach himself to fly, aided only by letters from Mr. Weir.

Taxi-ing practice having buckled several pairs of wheels on the rough ground, he determined to get into the air, made quite a creditable flight, and then touched a wing-tip on a low turn over a hillock, writing-off the machine—and, incidentally, from an upside-down position in the wreckage, soaked with petrol and oil, waving back the frightened spectators in order that a friend might secure a snapshot.

Thus the brief story of the first commercial aircraft. It would be interesting to trace the identity of the second.

Line of Least Resistance

OBSERVERS of modern tendencies in aircraft design cannot fail to have noticed the almost universal use into which has come the low-wing monoplane. The appeal of this type, in small as well as large aircraft, is largely to be found in the relative ease with which the undercarriage drag can be reduced. The proximity of the wing to the ground reduces the length of the undercarriage, and, whether it is to be "trousered" or made retractable, this is an advantage.

Modern conditions have become such that the aircraft designer can no longer afford to think merely of his own convenience. He must of necessity think of his customers, be they private owners or passengers in larger commercial types. It can scarcely be denied that the low-wing arrangement leaves something to be desired in the matter of view, more particularly from the back seats in a smaller type and from the middle seats of the larger type.

It would be well worth while getting together the opinions of a large number of air travellers on this point. Doubtless their reactions will differ, some being content with the low-wing view, such as it is, and a book to while away the hours of a long journey without troubling much whether or not they see anything of the country over which they are flying. Others, however, may very well feel that the obstruction by the wing of precisely that area of vision which alone is worth while is an irritation with which they should not be asked to put up.

Should it be found that a large percentage of air travellers are of the latter opinion, the aircraft designer will have to meet their demands, and the high-wing monoplane may once more resume the place it seems to have lost.

On Saturday, July 6, His Majesty The King inspected on the ground thirty-eight units of the Royal Air Force and reviewed a large number of the machines in a fly-past.

THE YEAR that has PASSED

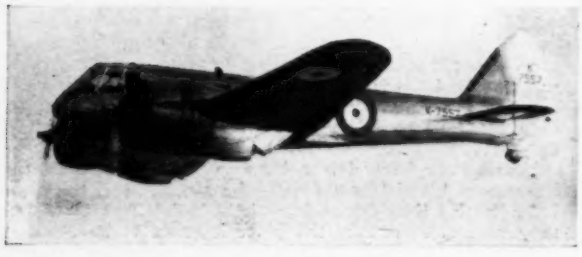
A Review of 1935 : Unprecedented Development on the Military Side and a Promise of Big Things Ahead in the Civil Aviation Sphere

LOOKING back on the records and achievements of the year 1935, one finds that for the Royal Air Force it has been a time of stir and excitement, of aspirations fulfilled or about to be fulfilled, and to some extent a feeling of coming into its own, in place of the hope deferred which for so many past years has made the heart sick. For civil flying, on the other hand, it has been a year of quiet progress seasoned with the promise of much better things shortly to come. That hope, there is every reason to believe, will not be deferred beyond the expected twelve months.

It was in 1923 that the Government, with Mr. Baldwin at its head, drew up a programme of fifty-two Home Defence squadrons as an immediate necessity. The beginning of 1935 saw only forty-two of them in existence. During the previous year had come the revelation that Germany, in disregard of the Treaty of Versailles, had built up an air arm of formidable proportions, and seemed likely to go on increasing it, and the British Government at once decided that our Air Force must be expanded in the interests of mere security. The first programme, in fact, had to be itself expanded, and the final decision, announced in May last, was to treble the strength of the Air Force, so that it should have a strength of 1,500 first-line machines by the end of March, 1937. Work on this programme has taken up most of the energies of the Air Ministry and of the Air Force during the past year.

The supply of so many more aircraft had to be accom-

OUTSTANDING 1935 MILITARY TYPES. From the Bristol 142 civil monoplane shown below a high-speed medium bomber is being developed. In its civil form the 142, with two 605 h.p. Bristol Mercury VIs, does 268 m.p.h. The A.W. XXIII (left) is a new bomber transport with two 760 h.p. Tiger VI engines. (*Flight* photographs.)



panied by an increase in personnel and in stations. The number of pilots had to be increased from about 420 to 2,500; aircraftmen and aircrafthands from 3,700 to 20,000; while fifty new stations were needed. The number of Flying Training Schools was raised from five to eleven (including Leuchars, which caters for the Fleet Air Arm), while at the same time their duties were to be cut down. Elementary flying training is no longer to be given at an F.T.S. but at a civil flying school, while the F.T. Schools concentrate on advanced training. Consequently the number of civil schools was increased from four to thirteen. It is a programme which has involved an immense amount of work and organisation.

Early in the year came the celebration of the King's Jubilee and His Majesty's decision to review the Royal Air Force. The honour thus bestowed on the Force gave the greatest satisfaction to all ranks. It might have been supposed that with so much work of expansion on hand the review might have been kept down to the simplest form. As a matter of fact, it took a far from simple form, and required a high degree of organisation and the nicest synchronisation. That everything went off according to plan without the slightest hitch gave a taste of the quality of the Air Staff. They came through with the traditional flying colours. Yet all the while the work of expansion went on unchecked.

Then came the outbreak of war between Italy and Abyssinia. The Fleet and the aircraft carriers went to the Mediterranean, and Sir Samuel Hoare has spoken of British reinforcements in Egypt, Malta and Aden. Details of those reinforcements cannot, of course, be published, but the state of general tension cannot have helped the Air Ministry in its work of raising new squadrons and training new officers and airmen. Air Chief Marshal Sir Robert Brooke-Popham had to leave his permanent post as Inspector General of the R.A.F. and take command of the Middle East. Yet still the work has gone on.

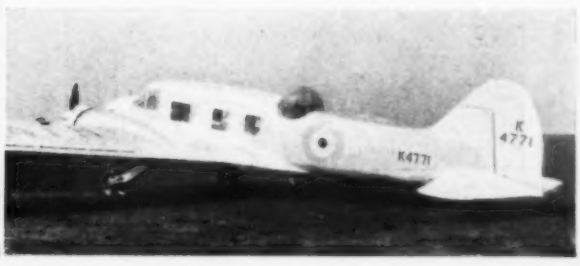
Problems of Personnel

The pages of *Flight* which are devoted to R.A.F. news have recorded week by week the various steps by which the Air Ministry is dealing with its various problems. At the beginning of the year it was decided that the air squadrons at Oxford and Cambridge Universities should accept all candidates for permanent commissions, and that when accepted they should go to Cranwell for final training, thus maintaining a common interest in all permanent officers. The periods of service of many Short Service and Medium Service officers have been extended. Many more applications for S.S. commissions have been invited, and the response by suitable young men has been most gratifying. The rules for accepting airmen for training as sergeant pilots have been relaxed in various ways, and the flying service of existing airmen pilots has been extended.

In procuring new aircraft, many of the old and somewhat hidebound rules about acceptance have been dispensed with, and some new types have even been ordered from an examination of the drawing-board plans in the designers' offices. Several well-proved types have been given an improved performance by the installation of new marks of engine. Notable among the new types produced, though definite orders have not yet been placed for all of them, are the Hawker monoplane high-speed, the Gloster Gauntlet and the Gloster Gladiator fighters, the Bristol medium bomber with two Pegasus engines, the Vickers medium bomber Wellesley with one Pegasus, and the Avro Anson general reconnaissance machine. The Overstrand has been taken into service during the year. The Fleet Air Arm is being supplied with two types of T.S.R. machines, the Blackburn Shark and the Fairey Swordfish, and with the catapult amphibian Walrus. New flying boats are the Short Singapore III, the Supermarine Scapa and Stranraer, and the Saro London. For army co-operation there is the Hawker Hector with Napier Dagger engine. For overseas squadrons the Vickers Vincent and the Hawker Hardy give increased powers.

Eleven new regular squadrons have commenced to form during the year, and this has entailed the moves of several existing squadrons to new stations, some of them only for a time. The Central Flying School has left Wittering

OUTSTANDING MILITARY TYPES. The fastest produced during the year was the Hawker monoplane (top), which, fitted with a Rolls-Royce Merlin engine, is now being tested. The Gloster Gladiator (below) is the first four-gun single-seater to be adopted, and does 260 m.p.h. at 15,500 ft. with a 715 h.p. Mercury VIII.



OUTSTANDING MILITARY TYPES. The H.P. 51 bomber transport (two 760 h.p. Tiger VI) has slotted flaps which give it a wide speed range. The Avro Anson (below) has been adopted as a standard coastal reconnaissance type. It does 188 m.p.h. with two 310 h.p. Cheetah IX's.

PERSONALITIES OF 1935: Some of the pilots who have made notable long-distance flights on British machines during 1935 (see table below). Left to right: Senor Pombo, H. F. Broadbent, H. L. Brook, Capt. E. W. Percival, Miss Jean Batten.

and has moved back to its original home at Upavon. Three new Auxiliary squadrons have been sanctioned, in the West Riding, West Lancashire, and the County of Cheshire. The new Flying Training Schools are at Peterborough, Montrose, Thornaby, Ternhill and Wittering. The new civilian schools are at Hanworth, managed by Flying Training, Ltd.; White Waltham, near Maidenhead, by the De Havilland Company; Reading, by Phillips and Powis; Sywell, near Northampton, by the Brooklands Company; Desford (Leicester), by Reid and Sigrist; Yatesbury, by the Bristol Company; Anstey (Coventry), by Air Service Training; and Perth, by Airwork.

COMMERCIAL AVIATION

So far as air line operation is concerned, 1935 was a year of consolidation and planning rather than of actual performance. The continued lack of vitally necessary ground organisation has hampered the development of internal air services, and we are now suffering from the effects of a virtual metamorphosis.

Absolute regularity of operation is depending more and more upon radio and instrumental research development and less upon the sheer skill and experience of our transport pilots. Before the end of 1936 this metamorphosis should be complete; ice formation should no longer be a source of worry, and blind approaches, at least, will probably be the order of the day. During the past year such approaches—and landings—have been made quite regularly at a number of Continental airports, and our early morning newspaper pilots have shown that it is possible to come into a really large airport in very poor visibility even with present radio equipment.

There has been a distinct tendency towards the co-operation which is so necessary while air services still fail to pay their own way. Although at least two internal or semi-internal routes have been profitably covered, two companies have found it necessary to suspend operations during the year, and the others are still awaiting the day when the public will take air travel seriously. This necessary pooling of resources was typified by the amalgamation, towards the end of the year, of Hillmans, Spartan and United, who were already in co-operation with Northern and Scottish, and Highland Airways. Forty internal routes were operated during the year, as compared with the thirty-five operated during 1934.

It had already been obvious that traffic control arrangements would need to be modified, since Croydon had too much to handle. As soon as Heston was equipped with D/F, a new zone system was inaugurated whereby Heston was virtually in charge of all internal traffic arrangements.

To-day's problems have, however, been largely forgotten in the excitement over Imperial Airways' Empire and Atlantic plans. Quite early in the year it was stated on good authority that this company was considering the use of flying boats for all through long-distance services, and in September the public learnt the details of the new boats which were being constructed. It was not until the general meeting, however, that the plans for the new era were given in full, and immediately afterwards representatives of the company, the Air Ministry and the Post Office left for the New World to consider the problems of an Atlantic service.

By far the greatest event in British civil aviation during 1935 was the planning of these new Empire air services, which, in 1937, are expected to transport all first-class mail by air between London and South Africa and London and Australia. Although the actual services will not begin to operate regularly during this year, the planning of organisation and the groundwork were undertaken in 1935, and that year also saw the placing of the largest order for civil aircraft ever given to a British firm in the whole history of flying, i.e., a total of twenty-nine flying boats which Short Brothers are building for Imperial Airways. Some of these boats will be finished during the spring and

PERSONALITIES OF 1935: Mrs. Jill Wyndham and Mr. David Llewellyn.

NOTABLE FLIGHTS BY BRITISH MACHINES IN 1935.

March 23-31: H. L. Brook, Miles Falcon (D.H. Gipsy Major), Port Darwin—Lympne, 7 days 19 hr. 50 min.

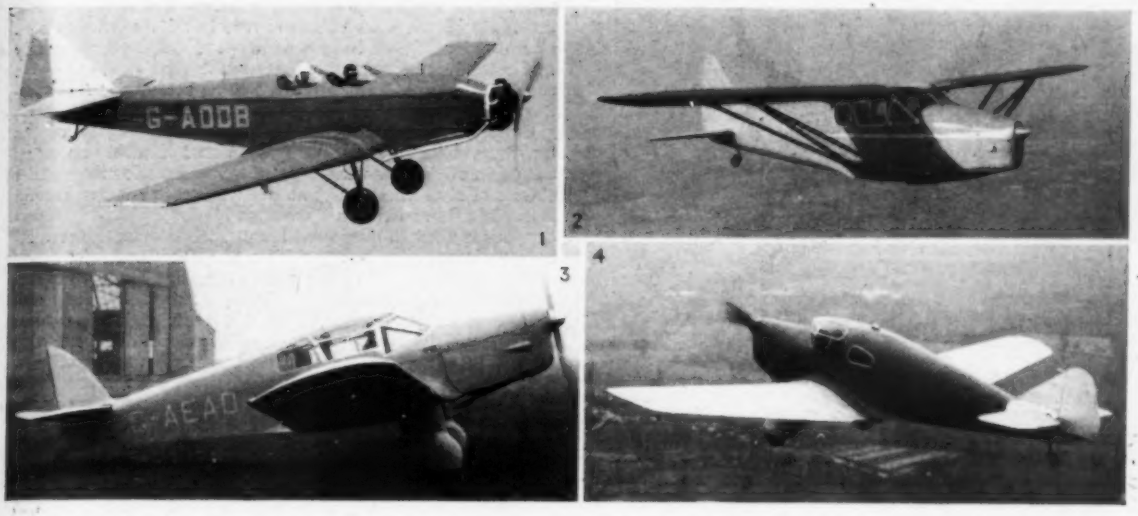
May 30: Senor Pombo, B.A. Eagle (D.H. Gipsy Major) Bathurst—Natal (Brazil), 16 hr. 55 min.

June 17: E. W. Percival, Percival Gull (D.H. Gipsy Six), Gravesend—Oran and back, 14 hr. 13 min.

November 2-8: H. F. Broadbent, Percival Gull (D.H. Gipsy Six), England—Australia, 6 days 21 hr. 19 min.

November 5-11: D. Llewellyn and Mrs. Jill Wyndham, Parnall Heck (D.H. Gipsy Six), Cape—England, 6 days 12 hr. 17 min.

November 13: Miss Jean Batten, Percival Gull (D.H. Gipsy Six), Thies (French West Africa)—Natal (Brazil), 13 hr. 15 min.



OUTSTANDING CIVIL TYPES: Four machines which made their first appearance during 1935: (1) the B.A. Swallow with Pobjoy 80 h.p. Cataract engine; (2) the Heston Phœnix five-seater with 200 h.p. Gipsy Six; (3) the Percival Vega Gull four-seater with Gipsy Six; (4) the Miles Merlin five-seater with Gipsy Six. (*Flight* photographs.)

early summer of this year, and experimental flights will be made to weed out any minor shortcomings that may come to light and to try out the boats and crews under actual service conditions.

Most of the boats will be finished with Empire air services in view, but one or two are to have different internal equipment and a much larger fuel tankage in order to make the flight across the Atlantic possible, either *via* the Azores and Bermuda or *via* Ireland-Newfoundland.

Also a part of 1935 planning is the Short-Mayo Composite aircraft, in which a small but heavily loaded seaplane is carried on the wing of a large but lightly loaded flying boat to an operational height of some 10,000ft. and then released on its journey across the Atlantic. It is calculated that the upper component of the Mayo Composite will be able to cover the Ireland-Newfoundland stage without refuelling, even when flying against an average head wind of 60 m.p.h. The return flight from Newfoundland to Ireland should be quite easy, and it seems likely that, if desired, a much greater payload could be carried on the eastward flight. If all goes well, the first experimental flights should be made during this year.

Meanwhile, the Empire duplication of services had been extended to Singapore, and survey flights had been made between Penang and Hong Kong, while in April it was announced that overland services would be run to Brindisi, *via* Marseilles and Rome. At the end of the year three separate companies were planning Scandinavian extensions, and another had made all arrangements for a service to Lisbon.

In Africa Imperial Airways are about to open a line from Khartum to Kano, and a new company, Elder's Colonial Airways, has been formed to carry on from Kano to Lagos, Accra, Kumasi, and later to Freetown, as occasion offers. This linking of the West African colonies with the main African air line should be of the greatest benefit to parts of the Empire which have hitherto seemed very isolated

The conference organised by the Society of British Aircraft Constructors to discuss air lines and airports aroused considerable interest. The discussion showed a fairly general desire for less control of civil flying by the Air Ministry. In sympathy with the recommendations of the Gorell Committee, the Air Ministry made public the terms of a Bill which is to be introduced into Parliament to make compulsory the insurance of aircraft against third-party risks.

Among the more outstanding events abroad were the Pacific preparations and experimental flights culminating in a complete return journey by the Martin *China Clipper;* the duplication and speeding-up of the K.L.M. Batavia service with new equipment; the co-operation between Air France and D.L.H. on the South Atlantic mail service; and the serious development of air services in New Zealand.

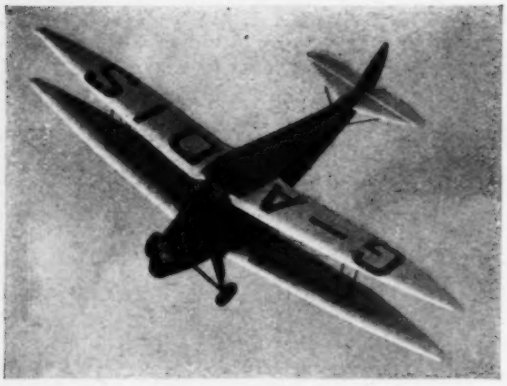
During the year Lord Londonderry made over the post of Air Minister to Sir Philip Cunliffe-Lister, who was later raised to the peerage as Viscount Swinton. Lieut.-Col. Shelmerdine was promoted from Director to Director-General of Civil Aviation in order to give increased dignity and importance to that office. Mr. Bertram retired from the post of Deputy Director of Civil Aviation, and was succeeded by Mr. J. G. Gibson.

The year has been a sad one in the number of notable personalities who have died. We have to mourn the parachutist, John Tranum; two directors or ex-directors of Imperial Airways in Lieut.-Col. Barrett-Lennard and Air Vice-Marshal Sir Vyell Vyvian; Aircraftman T. E. Shaw, formerly known as Col. T. E. Lawrence; Sir John Carden; Sir Richard Glazebrook; and that greatest of all long-distance pilots, Sir Charles Kingsford-Smith.

PRIVATE FLYING

THE continued increase in the amount of club flying and in the number of subsidised clubs, as well as the

OUTSTANDING CIVIL TYPES: This small commercial type, the Short Scion Senior with 90 h.p. Pobjoy Niagara engines, was produced in 1935. It has seating accommodation for ten passengers. (*Flight* photograph.)



OUTSTANDING CIVIL TYPES: The De Havilland Hornet Moth (130 h.p Gipsy Major) side-by-side two-seater.

renewed interest in the real light aeroplane—as exemplified by the B.A.C. Drone, the Aeronca, and the *Pou du Ciel*—conclusively proves that the interest in flying as a pastime grows more pronounced.

Nevertheless, the number of private owners remains a virtually stationary figure. Aeroplanes, in a country where the weather is so very fickle, are still limited in usefulness, though not in "pleasurefulness," and the keen amateur often prefers to do his flying without the necessity for incurring the responsibilities of ownership. By way of encouraging the impecunious, the Air League started a fund scheme for young pilots during the year, and several clubs have followed this example with somewhat similar schemes. In America the Bureau of Air Commerce has been endeavouring to stimulate private flying, and has encouraged the design of a number of easy-to-fly types.

Matters have comfortably settled down in the gliding world, and the few active clubs have been doing considerably more flying. There has been the added inducement offered by the Government subsidy, the terms for the distribution of which caused so much anxiety. During the National Gliding Competitions at Sutton Bank some 130 hours were flown, and this figure was half again as much as that registered during the 1934 event.

MODERN TENDENCIES IN DESIGN

AS was to be expected, the year which has just closed did not bring forth any very startling innovations in fundamental aircraft design. If, in spite of this fact, performances generally were improved and the efficiency increased, this was due to detail refinements rather than to fundamental changes in design.

Retractable or trousered undercarriages may now be said to have become almost standard equipment except on military biplanes, and the reduction or total suppression of the drag of this necessary evil has contributed greatly to the extra efficiency. Trailing edge flaps have made possible an increase in wing loading without sacrifice in landing speed, and cruising speed, range, and pay load have all benefited from the introduction of this modern aid to efficiency. The controllable-pitch airscrew has not yet come into extensive use in this country, but its advantages on aircraft types which have a wide speed-range are now fully understood, and there is little doubt that during 1936 a considerable number of aircraft will be fitted with this aeronautical equivalent of the motor car gear box.

Closely associated with the growing popularity of the low-drag undercarriage has been the almost universal adoption of the low-wing type of monoplane for the smaller classes of civil aircraft. The distance from wing to ground is a minimum, so that a "trousered" or "spatted" undercarriage is kept to minimum length, while even the retractable undercarriage benefits from the shorter struts.

In military aviation the monoplane has made considerable headway against the time-honoured biplane, and several of the new types which will make their appearance in 1936 will be of the monoplane type. While benefiting from low wings, retractable or trousered undercarriages, and trailing edge flaps, military aircraft of the biplane type have also shown a marked improvement in performance. This is almost entirely due to the introduction of fuel of 87 Octane value, which has made possible a much higher compression ratio, increased power output without increase in external engine size, and a reduced fuel consumption. There are many who hold the view that 1936 is almost certain to see the general adoption for military aircraft of 100-Octane fuels.

The Diesel Position

One result of the great advance made in the design of petrol engines and their fuels has been to push the diesel engine out of the picture as far as aviation is concerned. The very low specific weight of the modern petrol aero engine, coupled with a remarkably low fuel consumption, has made it impossible for the diesel to compete except for flights of much greater duration than normally undertaken by either military or commercial aircraft. That is not to say that work on developing the diesel should be dropped entirely, but it does mean that the cost of undertaking such work, with the leeway to be made up, is beyond the ability of private enterprise, and must, if it is to be done at all, become largely a Government responsibility.

From a structural point of view, the past year indicated two strong tendencies: the use of wood for small civil and commercial aircraft types, and smooth metal skin covering for large civil and military aircraft. The latter form of construction, although used with success by flying boat designers for many years, is something of an unknown quantity when applied to fuselages and, particularly, wings, and it will be very interesting to see how the different designers solve their problems. When, some ten or twelve years ago, the Air Ministry decided that military aircraft would in future have to be of all-metal construction, nearly every firm in the country set to work to evolve its own type of construction. Something of the sort seems likely to happen again while changing over to metal-clad or "stressed skin" construction, many of the problems of which are even more difficult in their way than were those of metal girder construction when that began.

PRINCIPAL WORLD'S RECORDS HOMOLOGATED UP TO OCTOBER 1, 1935

Record and Country.*	Pilot(s).	Machine.	Engine.	Date.	Place.	Record Figures.
			AEROPLANES			
Speed (F.)	R. Delmotte	Caudron	380 Renault	25/12/34	Istres	314.321 m.p.h. (*505,818 km/h*).
Distance (F.)	Rossi and Codos	Bleriot	550 Hispano	5-7/8/33	U.S.A.-Syria	5,657.4 miles (*9 104,700 km*).
Altitude (I.)	R. Donati	Caproni	600 "Pegasus"	11/4/34	Rome	47,352.6 ft. (*14 432 m*).
			SEAPLANES			
Speed (I.)	F. Agello	Macchi M72	Fiat	23/10/34	Desenzano	440.68 m.p.h. (*709,209 km/h*).
Distance (I.)	Stoppani and Corrado	Cant.Z.501	750 I.F.	16-17/7/35	Monfalcone-Berbera	3,063.2 miles (*4 929,597 km*).
Altitude (A.)	A. Soucek	Wright "Apache"	425 P. & W.	4/6/29	Washington	38,560 ft. (*11 753 m*).
			BALLOONS			
Duration (G.)	H. Kaulen	Balloon of more than *4 000 m³*		12-17/12/13	——	87 hours.
Distance (G.)	Berliner	" " " "	"	8-10/2/14	——	1,897 miles (*3 65,7 km*).
Altitude (A.)	Settle and Fordney	" " " "	"	20/11/33	Akron	61,237 ft. (*18 665 m*).

* Abbreviations for countries: A, America; G, Germany; F, France; I, Italy.

HOME FROM RIO: Miss Batten welcomed by the Mayor and Mayoress of Southampton.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

NEW Diesel engines which are presumably intended for the L.Z.129 are described in this issue.

Waterloo 3333 is *Flight's* new telephone number.

At a conservative estimate, Royal Air Force machines flew fifty million miles during 1934.

In spite of this greatly increased total over previous years, the number of serious accidents has been smaller.

Tapered wings and their characteristics at the stall is the subject of a notable article in this issue.

In reply to aerial bombing intended to divert its lava stream, Mauna Loa, the Hawaiian volcano, erupted far more fiercely.

The winding-up meeting of the Airship Guarantee Company, which was responsible for the R.100 and R.101, will be held on January 20.

A D.H. Dragon left Croydon on Monday for the use of the Ethiopian Red Cross. Air Commodore P. F. M. Fellowes is accompanying it and Capt. F. C. E. Hayter is the pilot.

Breguet 27-3 bombing and reconnaissance sesquiplanes are being delivered to the Chinese and Venezuelan Governments. With a 690 h.p. Hispano the type does over 180 m.p.h.

Twenty-five Years Ago

(From "Flight" of December 31, 1910.)

"Experiments are being carried out at Buc, by Mr. Maurice Farman, with a wireless telegraphy apparatus fitted to one of his aeroplanes. It was stated that, on Monday week, Mr. Farman was successful in transmitting messages for over a distance of about 6½ miles."

To Saigon Swiftly

M. André Japy, using a Caudron Aiglon monoplane with 100 h.p. Renault engine, has flown from Paris to Saigon, French Indo-China, in 3 days 15 hr. 30 min., which beats by a substantial margin the time set up by Lalouette and Goulette of 5 days 7 hr.

"299's" on Order?

A report from Washington states that the U.S. War Department has decided to order thirteen Boeing 299 bombers. An additional order has been placed for ninety bombers of unspecified type, but which are probably Martins or Douglases, costing £14,440 each. Each Boeing will come out at rather more than £50,000.

Wapiti and Moth to the Rescue

The Royal Research Ship *Discovery II*, which is to assist in the search for Mr. Lincoln Ellsworth and his companion, who were forced down on their flight across Antarctica on November 23, is carrying a Westland Wapiti and a D.H. Moth provided by the Australian Government.

COLLAPSIBLE—ON THE GROUND. This is the new inflatable glider invented by the head of the Experimental Institute of the Commisariat of Heavy Industry (*sic*). It has amphibious properties and weighs only 93lb. Although measuring 31 ft. in span it can be compressed into a bag which can be carried by two people. Already it has made a number of seemingly successful test flights.

STALLING of TAPERED WINGS

Triangular Plan Form the Worst : "Washout" No Cure : Partial Flap Makes Matters Worse : Advantages of Wing-tip Slots in Conjunction With Partial Flaps

By G. V. LACHMANN, Dr.Ing.A.F.R.Ae.S.

1.—Lift Distribution and Induced Velocity

THE interesting paper by Mr. P. P. Nazir published in "The Aircraft Engineer" Monthly Technical Supplement to *Flight* of November 28th, induces me to present some results in regard to the phenomenon of stalling of tapered wings which were obtained during the last few years by the aerodynamic section of Handley Page, Limited.

The fact that a tapered wing does not stall first at the centre but at the tips and that stalling creeps inwards from there towards the centre, illustrated by Mr. Nazir's tests, is by no means new to those who have devoted their attention to the aerodynamic characteristics of tapered wings; in fact it follows immediately from the application of the Lanchester-Prandtl theory.

In order to make this point quite clear, I may be permitted to repeat a few well-known general facts on the connection between plan form, lift distribution, induced velocity and effective angle of incidence. Any aerofoil which produces lift also produces an induced velocity w, which generally varies across the span according to the distribution of lift. If we call α_g the geometric angle of incidence of any aerofoil element, and if w represents the value of induced velocity at this point, then the effective angle of incidence α_e of this aerofoil element will be:

$$\alpha_e = \alpha_g - (w/V) \quad .. \quad .. \quad (1)$$

Lift and induced velocity at any point (y_1) of the span are according to the Prandtl theory connected by the well-known function:

$$w(y_1) = \frac{V}{4\pi} \int_{-S}^{+S} \frac{\frac{d(K_L \cdot c)}{dy} \cdot dy}{y_1 - y} \quad .. \quad .. \quad .. \quad (2)$$

which is really the nucleus of the aerofoil theory.

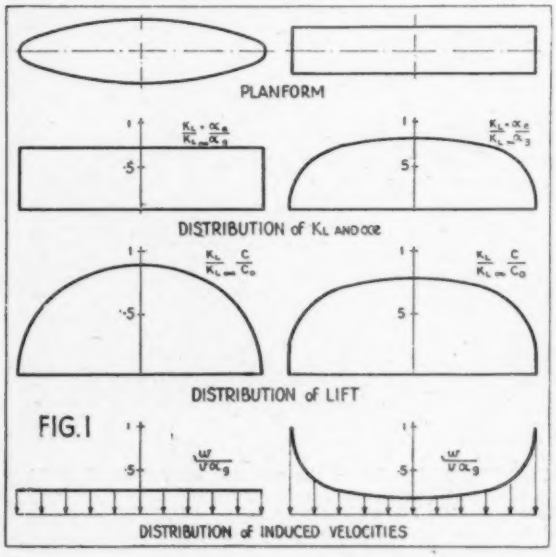


FIG. 1

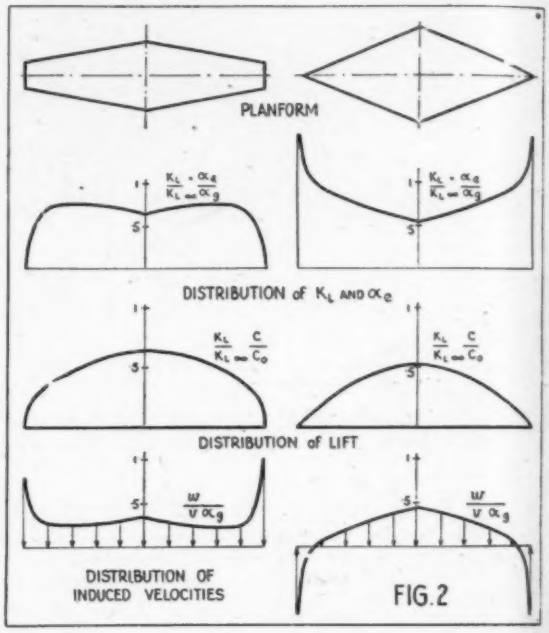


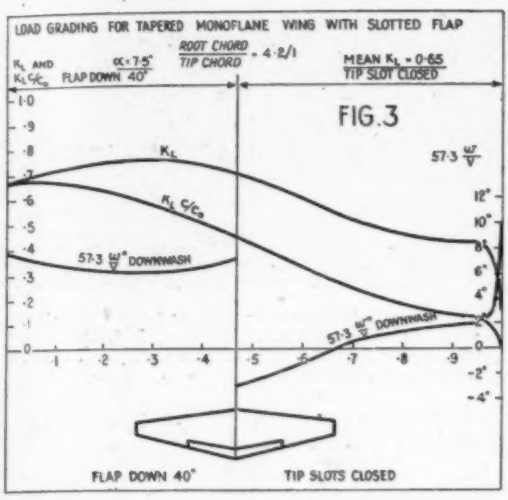
FIG. 2

In order to find the lift distribution for a given aerofoil, one can proceed as follows: One assumes in first approximation a plausible distribution of lift and calculates the downwash velocities at various points of the span according to (2).

Having found the downwash velocity the effective angle at each point of the span is known, and taking into acco the lift curve of the section at this point one can determine the lift produced: $K_L = \frac{dK_L}{d\alpha} \alpha_e$.. In order to satisfy the Prandtl theory and in order to make the assumed lift distribution into the actual one, the lift thus obtained should check up with the assumed lift. This is, of course, usually not the case, and therefore a second approximation has to be made and so on until the original lift and the check lift agree.

All graphical methods, for example the methods developed by Fage,[1] Jurieff,[2] Tani,[3] etc., are based on this principle. Alternatively the lift distribution can be calculated analytically by means of a Fourier Series according to Glauert[4], or by the method of Lotz[5] which is more accurate and less cumbersome than the Glauert method. The Lotz method has been introduced in this country in a very instructive article published in the *Journal of the Royal Aeronautical Society* of May, 1934, by Shenstone.[6]

Figs. 1 and 2 contain the main calculated aerodynamic characteristics for four typical aerofoil plan forms, namely: an ellipse, a rectangle, a trapezium and a straight taper with pointed tips. From the point of view of stalling, the distribution of effective angle of incidence across the span is of particular interest. According to this, an elliptical wing stalls simultaneously over the whole span. A rect-



angular wing will stall first at the centre, tapered and triangular wings will stall first near or at the tips. The triangular wing is particularly poor from this point of view, as stalling will occur at the tips even at very small values of K_L.

Theoretically the tip of a triangular wing is always stalled. In view of this it is difficult to understand why pointed wing tips have recently found favour with some designers.

2.—*Twisted Tapered Wings*

Obviously one possible method to prevent premature stalling of the tips of a tapered wing consists in applying a twist to the tips. As stalling of the tips is due to the increase of K_L towards the tips, a rational design rule would be, for example, to twist the wing in such a way as to obtain an elliptical K_L distribution towards the tips.

This method was first suggested by J. Hueber[7] in 1933, and a glider was actually built on these lines. The wing, consisting of a rectangular centre portion and tapered tips, had a taper ratio of only 1.54 and required a twist of − 9.5 deg. for the tapered portion.

The method seems only applicable to wings consisting of a rectangular centre portion and outer wings of small taper ratio. The following table* indicates that for fully tapered wings the twist (not linearly distributed across the span) and the increase in induced drag compared with the minimum value for elliptical lift distribution becomes excessive for larger taper ratios.

Taper Ratio c_t/c_o	Angle of twist = difference of geometric angles at root and at tip for overall $K_L = .5$.	$\frac{D_i}{D_i \text{ ellipt}}$
5.0	20°	1.21
2.5	19°	1.11
1.25	15°	1.01
1.0	13.5°	1.0

Apart from induced drag there will be a rapid increase of profile drag due to a low-incidence stall of the tips at small values of overall K_L, which obviously eliminates this method for modern fast aircraft.

3.—*Tapered Wing and Flaps*

On monoplane wings the flap has come as an unavoidable necessity. Therefore consideration in regard to the stalling of tapered wings has to be extended to the case where the tapered wing is fitted with a flap, especially to the case which is now generally met in practice, namely, a tapered wing fitted with a partial flap.

It is of no importance whether a slotted or split flap is used, although on certain aircraft the split flap is more used for the purpose of increasing drag than for increasing lift. The latter is invariably bound up with the increase of drag and hence, whether desired or not, the lift increase and its influence on lateral stability cannot be suppressed.

It has been shown above how the induced velocity reduces the effective angle of incidence and how reduction in downwash increases the effective angle of incidence. One can therefore expect quite generally that, as fitting a flap to the centre of a tapered wing naturally concentrates the lift distribution more towards the centre of the wing, the downwash is bound to follow and the effective angle at the wing tips will be still more increased than in the case of an ordinary tapered wing. It is, therefore, to be expected that this concentration of downwash towards the centre will cause premature stalling at smaller angles of incidence than in the case of a normal tapered wing.

One sometimes hears the fallacious conclusion expressed that a tapered wing fitted with a partial flap and conventional ailerons represents in effect a heavy washout over the outer portion of the span. Such a view can, of course, only be based on a very superficial judgment of the air flow. What matters really is not the geometric washout but the effective "aerodynamic twist" of the wing.

Fig. 3 shows the lift distribution calculated according to the Lotz method for a tapered wing of 1 : 4.2 taper ratio fitted with a partial flap. This taper ratio has been chosen as obviously the conditions become worse the more the trapezium approaches the triangle. A taper ratio of 4 : 1, on the other hand, has great advantages from a strength/weight point of view and also in regard to induced drag, which is practically the same as for an elliptical wing.

The lift distribution shown on the diagram refers to a geometric angle of 7.5 deg. and the mean K_L is .65. The critical point of the span in regard to stalling is obviously the position where the flap ends and the normal section of the outer wing begins. At this point, the K_L has just reached the maximum value of the normal unflapped section, and it is obvious that if, on further increase of the geometric angle of incidence, K_L increases at this position, a partial stall is to be expected. Observations of the flow over a tapered wing fitted with a partial flap seem to indicate that the actual lift distribution at this critical point differs from the theoretical predicted one, as stalling seems to start a little farther outboard than indicated by the calculated distribution. It is quite likely that pressure on either side of the critical position equalises, thus delaying the commencement of burbling, but one fact is very apparent when observing the flow over the tips, namely, the stalling of the tips on a tapered wing fitted with a flap starts earlier than on an ordinary tapered wing and is of a more violent character, comprising also a bigger area of the centre portion (see photos of air flow, Figs. 4 to 6).

The particular aerofoil used for the air flow observations

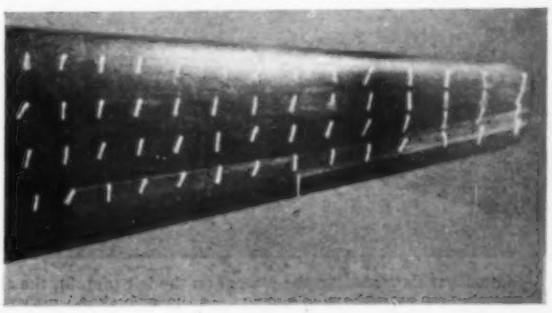
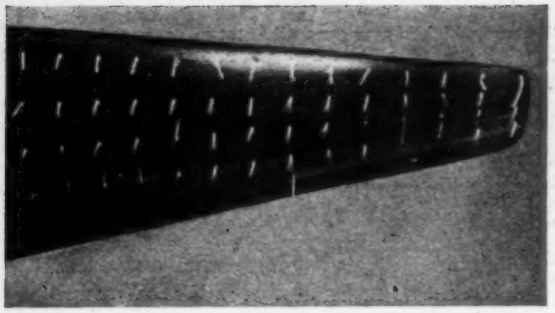
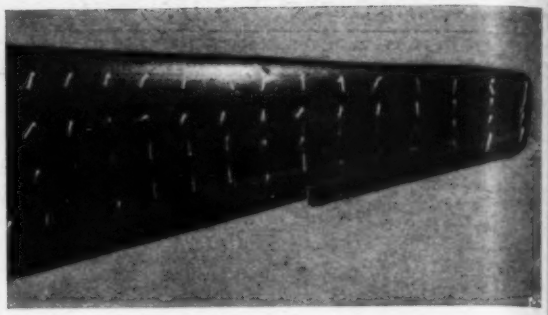


Fig. 4. Angle of incidence 14 deg., flap angle O. Note the orderly flow over the entire wing.

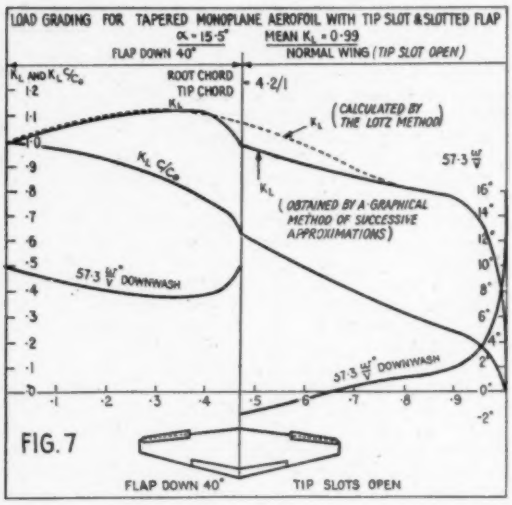
* Derived from Hueber's results.





Left, Fig. 5. Angle of incidence 16 deg., and flap angle O. Burbling begins inboard of the wing tip near the trailing edge. The centre portion is practically unstalled, with the exception of a few tufts in the rearmost line. In Fig. 6 (right), the angle of incidence is about the same—15 deg., and the flap angle is 40 deg. Burbling spreads inboard from the tips. The two rear rows of wool tufts are completely stalled and point forward.

was a blown up RAF.28 section, and the stalling of the wings seems to proceed from the trailing edge of the wing tip towards the centre of the aerofoil at an oblique angle relatively to the air flow. Whether this type of "trailing edge stall"[8] is typical for all tapered wings or only for this particular section is still an open question.



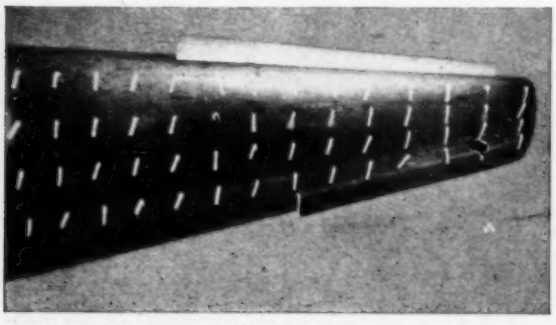
It has been suggested to extend the flap across the whole span in order to delay stalling of the tips. However, the K_L distribution thus obtained will be identical with that for an ordinary tapered wing, and the improvement can only consist in reducing the stalling characteristics of the wing with partial flap to those of the ordinary tapered wing which are already unsatisfactory. In addition a new type of aileron becomes necessary.

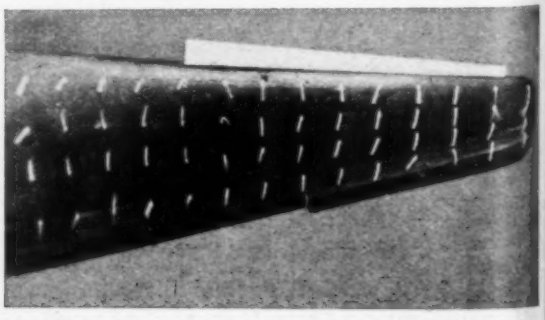
4.—*Tapered Wing and Wing Tip Slots*

Having realised that tapered wings were actually worse from the stalling point than rectangular wings, the use of wing tip slots became apparent immediately. Fig. 7 shows the calculated lift distribution for a tapered wing fitted with flap and wing tip slots extending over 50 per cent. of the semi-span. Two important points are evident from this calculated distribution, namely: (*a*) high mean K_L of about 1.0 as a result of a very effective K_L distribution across the span,* and (*b*) in spite of this high resulting K_L there is still a margin at the tips for damping in roll due to the falling off of the K_L curve towards the tips. Fig. 10 shows similar distributions calculated for taper ratios of 3 : 1 and 2 : 1, and although practically the same mean K_L is obtained over the span, it is very obvious that the reduced taper ratios are better from the point of view of damping in roll due to the steeper falling off of the K_L curves towards the tips. The K_L distribution towards the tips is comparable with that obtained for a twisted tapered wing. Flow pictures (Figs. 8 and 9) for a tapered wing fitted with a centre flap and wing tip slots indicate that there is still an orderly flow over the tips at angles where the centre portion of the wing is already completely stalled.

As a lift-producing element the front slot has been criticised for the large effective angle which is connected with lift increase. This characteristic, on the other hand, makes the wing tip slot particularly valuable and applicable to the tapered wing fitted with a partial flap, because of the very big increase of effective angle at the tips. In view of this, it is therefore also possible to obtain a very

* The increase of K_L max. due to the tip slots only is about 20 per cent. In other words, for a given wing loading and stalling speed the area of a wing fitted with partial flaps can be reduced by about 17 per cent. when fitting tip slots.





Slotted and flapped. In the picture on the left (Fig. 8), the angle of incidence is 14 deg. and the flap angle 40 deg. Note the orderly flow over the whole wing. In the right-hand picture (Fig. 9), with incidence increased to 16 deg. and flap angle still at 40 deg., the inner portion of the wing is completely stalled, but the outer portion, under the influence of the leading edge wing tip slot, still shows orderly flow.

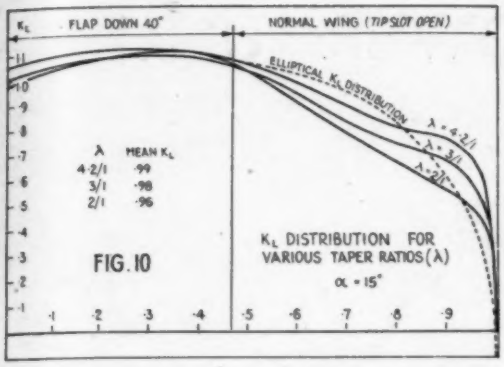


FIG. 10

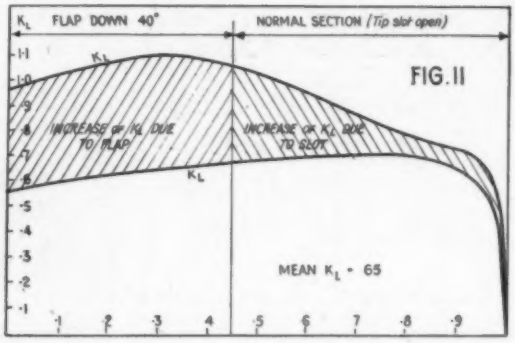


FIG. 11

large percentage of the available maximum lift of a tip slot at a relatively small geometric angle of the whole aerofoil. In the example given it will be noticed that the geometric angle is only 15.5 deg., which is not more than the stalling angle of the unslotted section. In spite of this a very substantial lift increase is obtained from the wing tip slots.

Fig. 11 shows a comparison between the lift distribution for an unslotted and unflapped tapered wing at its maximum overall lift and the lift obtained for the same wing when fitted with a partially slotted flap and tip slot. The shaded areas indicate the lift-increase due to flap and tip slot. It follows from this that on a tapered wing the tip slots actually contribute very materially to the maximum lift obtainable, even at the stalling angle of the ordinary section, whereas on a rectangular wing their contribution to the total lift at normal stalling angles is negligible. The superstall angle, *i.e.*, the angle at which the tip slots stall, is therefore also much larger for a rectangular wing than for a tapered wing.

The theoretically predicted mean K_L has been well confirmed by full-scale flight trials, and the maximum litt which was obtained on an aircraft fitted with the same wing as used for the calculation gave a measured maximum K_L of 1.06, and the damping-in roll at this K_L was still perfectly satisfactory. This K_L was actually obtained on an aircraft of nearly 10 tons all-up weight.

The writer is indebted to his collaborators Messrs. R. S. Stafford and J. R. Crean, who worked out the lift grading curves and to Mr. F. R. Hounsfield who took the flow pictures in the Handley Page wind tunnel. He also wishes to express his thanks to Messrs. Handley Page for their permission to publish certain results which were obtained by their aerodynamic section.

REFERENCES.

1 "On the Theory of Tapered Aerofoils." By A. Fage, A.R.C. Sc., R. & M. Report, No. 806.
2 "The Aerodynamical Characteristics of Wings of Arbitrary Plan Form." By B. N. Jurieff, Vestnik Vozdushnogo Flota, No. 2 (Moscow, 1923).
3 "A Simple Method of Calculating the Induced Velocity of a Monoplane Wing." By Itiro Tani, Report of the Aeronautical Research Institute, Tokyo Imperial University, Report No. 111.
4 "The Elements of Aerofoil and Airscrew Theory." By H. Glauert.
5 "Berechnung der Auftriebsverteilung beliebig geformter Flugel," Z.F.M. 1931, p. 189. By J. Lotz.
6 "The Lotz Method for Calculating the Aerodynamic Characteristics of Wings," May, 1934, *The Journal of the Royal Aeronautical Society*. By B. S. Shenstone.
7 "Der verwundene Trapezflugel," Z.F.M., 1933, p. 307. By J. Hueber.
8 "Stalling," *The Journal of the Royal Aeronautical Society*, September, 1934. By B. Melvill Jones.

THE LATE ROBERT LORAINE

IT seems a very long time ago since Robert Loraine, who died in a nursing home after an operation just before Christmas, was astounding the embryonic flying world with his daring feats in a Henry Farman biplane with Gnome engine. Since the war one has thought of him almost exclusively as an eminent actor and theatrical manager, but in the pages of *Flight* of the year 1910 he appears constantly as one of the most notable of the flying pioneers.

He learned to fly in France in June, 1910, and his French certificate No. 126 was accepted by the Aero Club of the United Kingdom. He took his Henry Farman to the flying meetings at Bournemouth and Blackpool in that same year. After the latter meeting was over he flew down to Southport, and then daringly set out across the sea to Cemlyn, near Llandudno. There he had a minor crash, but repaired his machine and reached Holyhead. After spending a night there he set out to fly the Irish Sea to Dublin. It was a tremendously reckless feat, considering how unreliable were the engines of those days, and to make matters worse he had no flotation gear of any sort. He had plenty of excitement during the crossing, though, to be fair to the Gnome, it was the petrol feed which nearly proved his undoing. Six times while he was over the open sea did the engine fail and bring him down almost to the level of the water, and each time it picked up just in time and allowed him to regain his height. When he was within a couple of hundred yards of Howth the final failure occurred, and the Farman and Loraine went into the sea. He swam to the lighthouse.

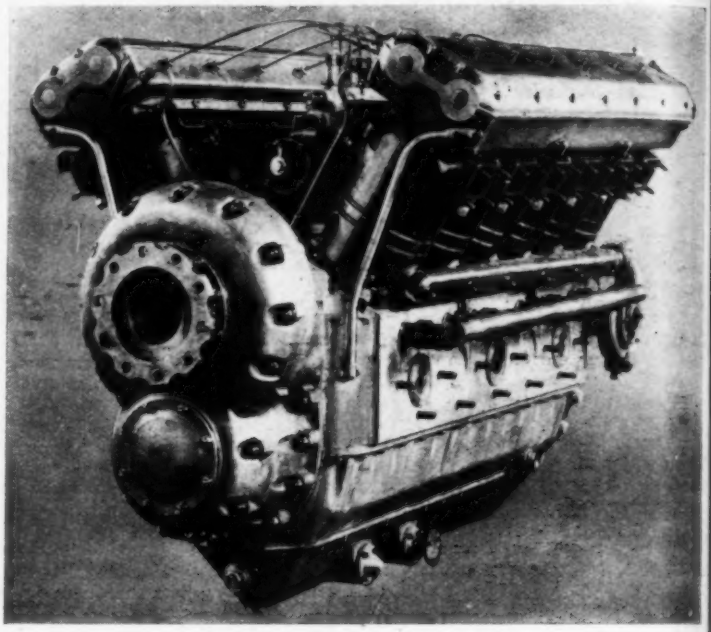
In the Army manœuvres that autumn Loraine flew a Bristol fitted with a W/T transmitting set, and sent messages quite successfully from a distance of a quarter of a mile.

On the outbreak of war Loraine joined the R.F.C., and on October 26, 1915, he won the Military Cross for a daring attack on an Albatros. He drove it down from 9,000 feet to 600 feet, wounded the pilot and hit his camera and wireless transmitter. The Albatros fell in our lines. The citation in the *London Gazette* described this as a feat of "conspicuous gallantry and skill." In the Birthday Honours of 1917 he was made a Companion of the Distinguished Service Order. At the battles of the Somme he commanded No. 40 Squadron, which he had himself raised. In due course he was promoted to Lieut.-Colonel and commanded a training station at home.

Mr. Robert Loraine at a Bournemouth meeting in 1910.

THE L.Z.129's POWER UNITS

Details of the New Mercedes-Benz Oil Engines : 750 h.p. at 1,750 r.p.m. : 3.8 lb. h.p.



In these days of *monobloc* cylinder castings, the separate water-cooled cylinders of the new Mercedes-Benz engines strike an unfamiliar note.

AS reported elsewhere in this issue, it is now practically certain that the new Zeppelin, L.Z.129 (which was described in *Flight* of October 3), will be launched within the next three months. Thus there is particular interest in the details of a new Mercedes-Benz Diesel engine of the type which is presumably to be fitted to the airship.

Known as the O.F.2, it is a water-cooled 60 deg. vee-twelve, in which, following the practice successfully applied in their heavy-oil commercial vehicle engines, the Daimler-Benz works have employed the four-stroke in conjunction with pre-combustion.

The crank case, of three sections, is cast in Elektron, and single-row roller bearings carry the six-throw crankshaft, at the rear end of which is a vibration damper. The cylinders, which are cast separately and have non-detachable heads; each have two inlet and two exhaust valves. The pre-combustion chamber lies in the centre of the head, midway between the four valves, and the oil is injected into it by a Bosch nozzle. The water jackets are of sheet steel, welded to the cylinders.

Each of the alloy pistons carries four rings and two scrapers. Of the floating type, the gudgeon pins are laterally located by pegs. The master connecting-rods are of I section and the auxiliary rods of circular section. The former have three-row roller big ends and the latter are attached to the main rods by the medium of needle roller bearings.

Two overhead camshafts are employed, located in Elektron housings and driven by shafts and bevel gearing.

To facilitate starting, heater plugs are employed in the pre-combustion chamber. Starting is effected by means of compressed air.

Two centrifugal pumps, one for each cylinder bank, attend to the cooling water circulation, and are accessibly arranged at the rear end of the crank case, while a gear-type oil pump is situated in the lower portion of the crank case. The reduction gear is of the spur wheel type, and has a ratio of 1.73:1. The principal data are as follows:—

Bore, 165 *mm*; stroke, 210 *mm*; total cylinder capacity, 53,88 *litres*; cruising power, 720 h.p. at 1,720 r.p.m.; full-throttle power, 750 h.p. at 1,750 r.p.m., short-period output, 800 h.p. at 1,790 r.p.m.; weight dry, 935 *kg* (3,061 lb.); weight per h.p., 1.17 *kg* (3.8 lb.) (at 800 h.p.); compression pressure, 532-560 lb./sq. in.; max. pressure, 840 lb./sq. in.; injection pressure, 1,330 lb./sq. in.; length overall (without airscrew hub), 1 880 *mm* (74in.); width overall, 980 *mm* (38.2in.); height overall, 1080 *mm* (42.5in.).

The Book of the Day

THE welcome given by the public to *Flight's* book *Squadrons of the Royal Air Force* has not in any way surprised us, but it has been most gratifying. The interest taken by everybody in the Air Force, which is now being so vigorously expanded, is both wide and deep, and before this book was published there was no ready means, other than the pages of *Flight*, of learning about the organisation of that Force, the work of its various squadrons, and the elaborate training organisation. A member of the staff has seen a reader looking through the numerous illustrations and interspersing exclamations of admiration with the repeated confession, "How little we know about the R.A.F.!" For the future there will be no excuse for any person to make that admission, and the process of filling up gaps in knowledge will, we feel sure, be made by this book not a drudgery but a pleasure.

R.Ae.S. Southampton Branch

IT has long been felt that a branch of the Royal Aeronautical Society should be formed at Southampton in view of the concentration of aeronautical activity in that neighbourhood.

In the summer of this year a ballot was taken by the Society to see what response would be forthcoming. The result was very encouraging, and in the autumn a committee was formed to start the new branch under the chairmanship of Wing Cdr. Cave-Browne-Cave, who is Professor of Engineering at University College, Southampton.

The inaugural address was given at the end of October before some 250 people by the president of the society, Lt.-Col. Moore-Brabazon, and since then several lectures have been given, while a programme for the future has been drawn up.

The honorary secretary of the branch, which has now nearly 200 members, is Mr S. Scott-Hall, to whom enquiries may be addressed at the Supermarine Aviation Works (Vickers), Ltd., Woolston, Southampton.

Towards the Gliding Subsidy

THE Federation of British Gliding Clubs has now prepared a scheme for the registration of gliding clubs as of limited liability for the modest fee of £3. The scheme is available to all clubs joining the Federation. Incidentally, clubs with less than twenty-five members are eligible for enrolment. The address of the hon secretary is Lady Place, Sutton Courtenay, Berks.

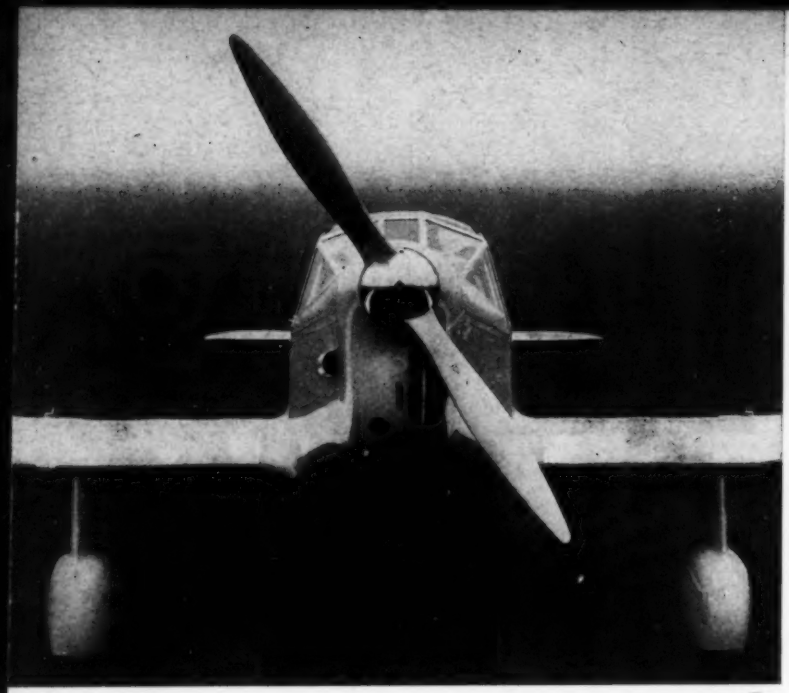
Aviation Paper Discontinued

THE monthly publication, *Aero and Airways*, it is announced by Bernard Jones Publications, Ltd., is to be discontinued. The publishers state that "no paper can exist nowadays without a reasonable number of advertisements, and whilst we have had loyal support from our readers, we have not had the support we expected from aircraft manufacturers."

JUST A FEW of the scores of Christmas and New Year greeting cards received by *Flight* from friends all over the world. Very many thanks!

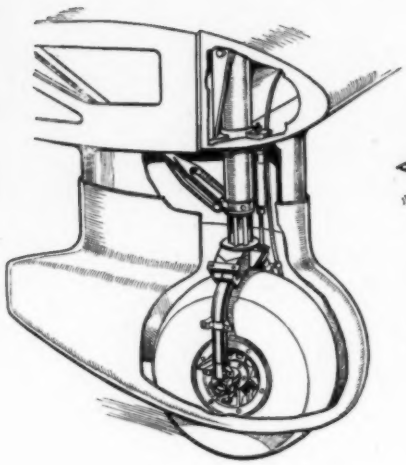
A ROOMIER

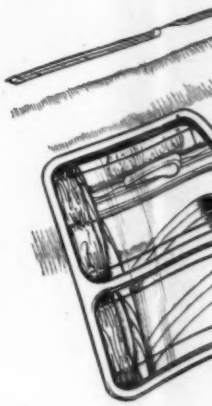
The Vega Gull : Seats for Four and
a Gipsy Six Engine : Many Prac



The cabin of the Vega Gull is 44 in. wide and permits side-by-side seating without cramping. (*Flight* photograph.)

In the sketch on the right one half of the simplified undercarriage is revealed.



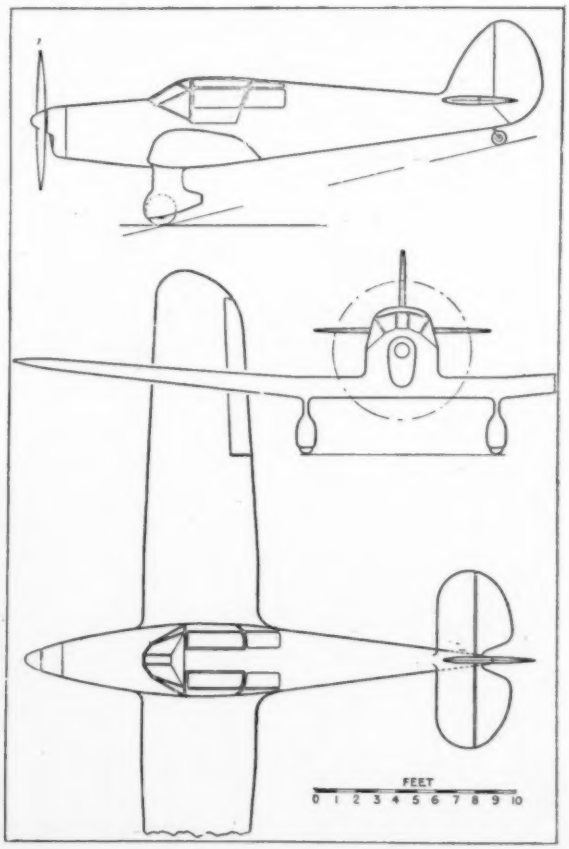


ESSENTIALLY the new Percival Vega Gull follows standard Percival practice, and might, in fact, be regarded as a scaled-up and cleaned-up Gull. It is notable chiefly because it carries four people, with a high degree of comfort, at a speed barely 5 m.p.h. less than that attained by last year's three-seater Gull. An increase of 15 sq. ft. in wing area keeps the landing speed down to the 45 m.p.h. of the smaller machine.

Cabin Comfort

The fuselage, which is 9 in. longer than that of the Gull, has a spruce framework and plywood covering. A thin cotton fabric known as nainsook, or madapollam, is applied, protecting the ply and forming a base for the Titanine finish. The cabin is 44 in. wide and its four seats are arranged in pairs, the two front seats being of the bucket type. The rear pair is luxuriously upholstered and provided with armrests. Soundproofing—which, like the upholstery, is the work of Rumbold—is incorporated, and from all viewpoints the cabin is comparable with that of a saloon motor car. There is a door on each side of the cabin and windows of splinterproof glass.

Dual controls are optional, as are the electric starter

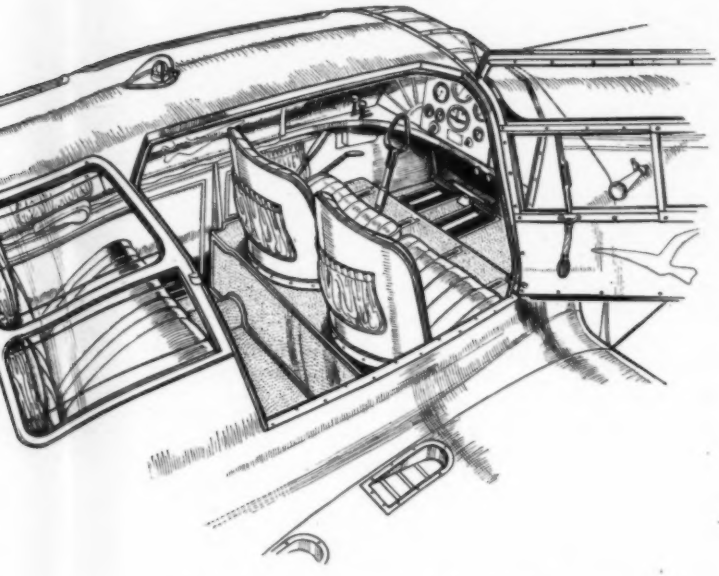


Say "Ah!" Capt. E. W. Percival, designer of the Vega Gull, inspects the flaps (which are of greater area than those of the Gull) on the machine he demonstrated at Gravesend. (*Flight* photograph.)

ER PERCIVAL

Four, and a Speed of 170 m.p.h. With Many Practical Detail Modifications

An improved wing-folding arrangement has been introduced on the Vega Gull. It embodies a tommy bar (which disappears inside the wing) in place of the old fixed handle. (*Flight* photograph.)



The general arrangement of the surprisingly roomy cabin is apparent in this *Flight* sketch. The small lever on the left of the pilot's seat (although in this case only one set of controls is fitted, dual controls are optional) operates the split trailing-edge flaps.

and sun blinds fitted to the machine demonstrated the other day at Gravesend Airport by Capt. Percival. Luggage is carried in a separate compartment behind the cabin. Smith's instruments are fitted, and there is a Reid and Sigrist Gyorizon. As in the 1935 model of the Gull, fresh air is taken to the cabin from a small scoop on the starboard wing. Provision has been made for the installation, if necessary, of a simple heating system from the exhaust.

In span the wing of the Vega Gull measures 3 ft. 4 in. more than that of the Gull. Structurally, however, it is identical, having spars of spruce and plywood, lattice bracing of spruce, ribs of the same material and fabric covering. The locking device for the folding wings has been improved and now embodies a disappearing tommy-bar in place of a fixed extraneous handle.

Cleaning-up

Two 20-gallon petrol tanks are housed in the wing, as in the Gull, and allow a range of 620 miles. The external actuating levers for the ailerons have been done away with in the name of aerodynamic cleanliness. Cleaning-up is also apparent in the undercarriage (which, incidentally, now has a 6¼ in. travel, compared with the 5¾ in. of the older model), the small bracing strut from the compression leg to the spar having been eliminated *à la* Mew Gull. Wheels and tyres, as previously, are Dunlop and Bendix respectively. The pneumatic tail wheel is completely orientable and self-centring and is carried in a fork.

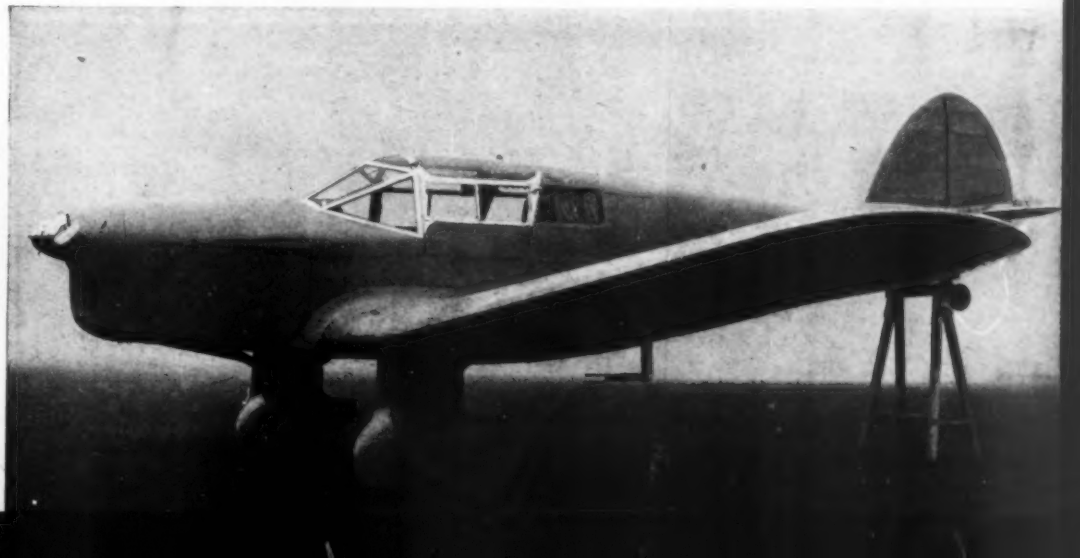
A Gipsy Six engine of 200 h.p. is fitted as standard, and a De Havilland or Ratier controllable-pitch airscrew is optional. The installation of one of these benefits take-off and cruising speed.

The split trailing-edge flaps are generally similar to those of the Gull (this means that they do not extend across the bottom of the fuselage and are worked by a lever on the port side of the pilot), but are increased in span and chord. Not more than a 10 lb. pull is required for their operation.

Such beneficial features as the new type of undercarriage are being incorporated in the 1936 model of the Gull, the maximum speed of which has been increased about 4 m.p.h.

PERCIVAL VEGA GULL
Four-seater Cabin Monoplane
D.H. Gipsy Six, 200 h.p.

Span	39 ft. 6 in. (*12,04 m.*)
Length	25 ft. 6 in. (*7,77 m.*)
Wing area	184 sq. ft. (*17,1 m².*)
Tare weight	1,575 lb. (*716 kg.*)
Gross weight	2,750 lb. (*1 250 kg.*)
Maximum speed	170 m.p.h. (*274 km/h.*)
Cruising speed	150 m.p.h. (*242 km/h.*)
Stalling speed	45 m.p.h. (*72 km/h.*)
Range	620 miles (*1 000 km.*)
Service ceiling	18,000 (*5 500 km.*)



Despite the fact that the Vega Gull has the same power plant as last year's three-seater Gull it carries its four passengers at 170 m.p.h. Capt. Percival, in fact, says that the maximum speed is a shade over this figure. (*Flight* photograph.)

FOR PURSUIT over SEA

Potez Flying Boat of Unorthodox Layout : New 680 h.p. Two-row Hispano

THE Henry Potez Company has recently delivered for "homologation" at the San Raphael seaplane base a new single-seater fighter flying boat designated the Potez 453.

It is a high-wing, single-engined machine with a strut-braced wing carried above the hull on a system of struts. The structure, which is designed to withstand the strains of catapulting, is of wood throughout, the wing, which, incidentally, is fitted with conjointly operated slots and trailing-edge flaps, being covered with plywood. This material is also used for covering the hull, tail surfaces and wing-tip floats

The engine mounting is of circular form and carried by two sets of N struts over the hull, the actual engine nacelle being above the wing, into which it is faired. Fuel tanks are carried behind the engine, which is a two-row 14-cylinder Hispano-Suiza radial known as the model 80. It drives a three-bladed tractor airscrew mounted well above the line of sight of the pilot, who has a cockpit aft of the wings.

Delivering 650 h.p. at 2,400 r.p.m. at sea level and 680 h.p. at 11,480 ft., the Hispano-Suiza 80 is geared and weighs 990 lb. Its diameter is only 3ft. 4in. and its length 4ft. 6in. With a 135 mm. bore and a stroke of 130 mm. it has a capacity of 1,588 cubic inches. The compression ratio is 6.2:1.

POTEZ 453

SINGLE SEATER NAVAL FIGHTER FLYING BOAT

Hispano-Suiza 80, 680 h.p. at 11,480 ft.

DIMENSIONS.	
Span	36ft. 5in. (*11,20 m*)
Width folded	15ft. (*4,64 m*)
Wing area	205 sq. ft. (*19 m²*)
Height	11ft. 3in. (*3,46 m*)
WEIGHTS AND LOADINGS.	
Weight empty, with equipment	3,131 lb. (*219 kg*)
Weight loaded	4,050 lb. (*1840 kg*)
Power loading	6.16 lb./h.p. (*2,8 kg/h.p.*)
Wing loading	19.86 lb./sq. ft. (*97 kg/m²*)
PERFORMANCE.	
Maximum speed at 11,480 ft. (*3500 m*)	212 m.p.h. (*340 km/hr*)
Climb to 11,480 ft. (*3500 m*)	4 min.
Stalling speed	56 m.p.h. (90 *km/hr*)
Ceiling	30,000 ft. (*9000 m*)

A single-seater fighter flying boat : this striking snapshot shows the new Potez 453 under test. It will be interesting to see how it compares with twin-float seaplanes in carrying out the duties for which it is intended.

A Seaplane "Pou"

THE *Pou* has reached the South Seas. Mr. P. R. Challier, of the Aero Club de Tahiti, French Oceania, started its construction on the boat between Panama and Tahiti, and he and four part-owners were, at the time at which this news was received, waiting only for an engine.

It is fitted with plywood floats of 3 m. by 80 cm. and, being an ex-"C" pilot of the London Gliding Club, Mr. Challier did think for a time of using the machine as a glider—but thought better of it. With the additional weight and drag of the floats, it would appear that this *Pou*, at least, will require a rather more powerful engine than usual.

THE ENTERTAINING MRS. LINDBERGH

"North to the Orient," By Anne Morrow Lindbergh, with maps by Charles A. Lindbergh. (Chatto and Windus, 10s. 6d. net.

A MOST delightful book Everyone knows that Mrs. Lindbergh is a most courageous woman and a very competent woman, but hitherto few people on this side of the Atlantic can have known that she is a literary genius. The word "genius" is a superlative, but it is used advisedly. Books describing air travel and air adventure are now common, almost too common, and it must be hard for the writers who follow on to find anything new to say about the subject. Such books usually consist of three elements, attempts to describe the sensations of looking down on the world and travelling at speed across it, technical matter about the aeroplane and engine, and rewritten excerpts from guide books about the places visited. When one has read one or two such books one feels that one has read them all.

To the delighted surprise of the reader, Mrs. Lindbergh shows that he has been wrong. In this book she gives, not a record or diary of her flight with her husband from Washington to China, but a series of sketches of events on that trip. It is difficult to express in words the peculiar quality of her book, but some idea may be given by saying that it is the reverse of hackneyed. It contains all the three elements mentioned above, but each is treated with the freshness and originality of Mrs. Lindbergh's own mind—she must be a very charming personality—and with great happiness of expression.

One or two brief extracts may give some idea of the quality of the book, though it seems unfair to make selections from such a treasure. After the pressmen had plagued them at Washington and New York, they flew to Mrs. Lindbergh's old home at North Haven in Maine, and everyone turned out to see the Sirius land. "These friends had known me so long; they had seen me come in from a cold sail a hundred times with a red nose and blowing hair. They had watched my confusion and misery when I backed the old Buick into the ditch and somebody's fence. They had pulled me out, too. There was no mystery about me for them to peer curiously for. I would not disappoint or thrill them. Even for my husband there was a different kind of curiosity. Of course, they all wanted to see him, and they would not have missed it for anything. But, after all, he could not really be such a mysterious person. Hadn't he married Anne?"

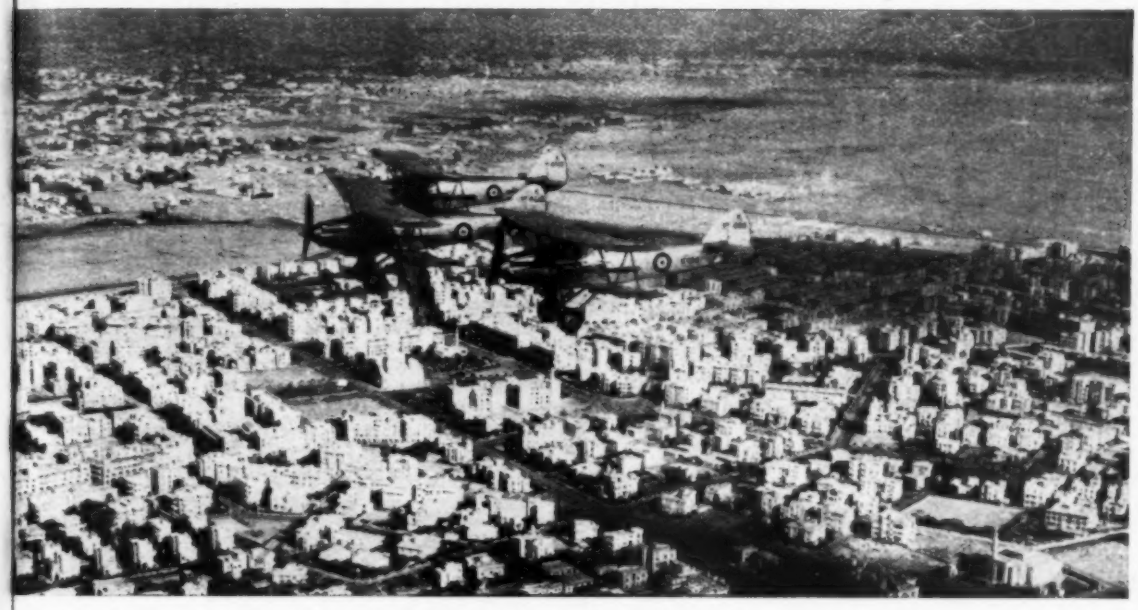
Swimming for It

On the flooded Yangtze river H.M.S. *Hermes* took charge of the Sirius, and when lowering the machine into the river with the Lindberghs both on board the seaplane turned over and they had to swim for it. "Not only did I have no fear, I had no sensation at all—no realisation of going under water or of getting wet, or of my clothes being heavy to swim in, or even that the life preserver had not worked. Quite typically I had not pressed the lever far enough. It did not matter. I had come up and was swimming along easily with yards of deflated life preserver dragging after me . . . We were swept downstream to the lifeboat, where we climbed on board and wiped our faces. I coughed up some Yangtze water. 'And for three weeks,' I thought, 'I've been brushing my teeth in boiled water.'"

Col. Lindbergh's sketch maps at the head of each chapter are excellent and help the reader to follow the story. All travel books should have maps like these. F. A. de V. R.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS *AIR MINISTRY ANNOUNCEMENTS*



IN THE EAST: A striking picture of a flight of three Hawker machines of No. 208 (Army Co-operation) Squadron flying over Cairo. This squadron is stationed at Heliopolis and is the only one of that class in the Middle East Command. It has been stated that the concentration of Italian troops and Air Force units in Libya is regarded as a possible menace to Egypt, in case Signor Mussolini should decide that some sanctions constituted a *casus belli*. Sir Samuel Hoare, however, made mention of British reinforcements in Egypt, Malta and Aden.

R.A.F. SUB-DEPOT, ORPINGTON

The R.A.F. Sub-Depot, Orpington, will remain open until approximately June 24, 1936.

STUDY OF FOREIGN LANGUAGES

The following officers have been provisionally selected to undergo training in foreign languages during 1937-38:—F/O. D. A. Pemberton, Arabic, in Iraq; F/O. A. H. Allen, Kurdish, in Iraq; F/O. R. A. C. Barclay, Japanese, at the School of Oriental Studies, London; and F/O. R. J. Knights-Whittome, Russian, at the School of Slavonic Studies, London.

TRANSFER OF OFFICERS TO THE RESERVE

The undermentioned short service and medium service officers should note that they become due in June-July, 1936, for transfer to the reserve on completing their period of service on the active list:—

General Duties Branch

Flight Lieutenants.—William Hawkesley Burbury, Edward John George, Frederick Walter Hick Hall, George Valentine Thorpe Thomson.

Flying Officers:—Richard Gilbert Milner Apthorp, Edward Mortlock Donaldson, Richard Hames Younghusband, John Wilmot Bateman, Jasper George Cardale, Guy Lambton Menzies, Ronald Hanson, Dudley Hardwicke Marsack, Cecil Leslie Monckton.

F/O. J. G. Cardale has been provisionally selected for a permanent commission.

Medical Branch

Flight Lieutenant:—John Frederick Stewart Wiseman, M.B., Ch.B.

OBSTRUCTION—DIGBY AERODROME

Two "C" type sheds are being constructed at Digby and will constitute a flying obstruction. Night landings are prohibited until further notice. The obstruction will not be marked by day or night.

CIVIL AVIATION GROUND ENGINEERS' LICENCES

Examinations for serving officers and airmen will be held as follows:—

(i) London, weekly on each Tuesday in January, February and March, 1936.

(ii) Croydon, on the second Friday in January, February and March, 1936.

(iii) Manchester, on the first Friday in March, 1936.

(iv) Bristol, on the first Friday in January, 1936.

(v) Glasgow, on the first Thursday in February, 1936.

LONG SERVICE AND GOOD CONDUCT MEDALS

The Long Service and Good Conduct Medal has been awarded to the undermentioned airmen:—

W.O.2s Gleen, C. F., and Kemsley, A., D.S.M.; Flt. Sgts. Caldow, T. C., Costick, G., Donaldson, S. R., Ellcock, T. W., Fraser, W., Green, A. J., Hartzig, J. W., Haskell, A. J., Hibberd, E. V., Orbell, H. G. A., Payne, J., Semple, J. K. McK., Steers, E. A., Sturt, W., Thompson, W., Watson, G., Wilson, J. W.; Sgts. Clark, J. C., Duncan, R., Elms, F. T., Fairhurst, W. A., Hallett, F. J. A., Hodgson, C. W., Locke, S. V., McKean, J. M., D.F.M., Mutton, V. E., Ruffell, A. E., D.C.M., Smith, W. G., Warden, V. W. F., Westcott, C. W., Wheeler, G. R., Williams, D. H.; Cpls. Bowditch, R. H. H., Easom, A. E., D.C.M., Elliot, H. C., Forth, E. R., Harding, V. C., Hayles, J., Hudson, G., Keirl, F. H., Marshall, G., Redstone, C. E., Simmons, H. G., Smith, H., Turk, W. E., Woods, P.; L.A/C.s Player, J., and Wood, F. W. R.

AERODROME CIRCUIT RULES

In view of the close proximity of the seaplane station to the aerodrome at Lee-on-the-Solent, all aircraft operating from or visiting Lee-on-the-Solent are, when in the vicinity of that station, to adopt right-hand circuits. The circuits are to include both the aerodrome and the sea-landing area in front of the slipway.

R.A.F. BENEVOLENT FUND

The usual meeting of the Grants Committee was held at Iddesleigh House on December 23. Air Comdre. B. C. H. Drew, C.M.G., C.B.E., was in the chair, and the other members present were Mrs. L. M. K. Pratt Barlow, O.B.E., and Group Capt. C. H. K. Edmonds, D.S.O., O.B.E. The Committee made grants to the amount of £519 16s. 8d. The next meeting was fixed for January 13.

DENTAL OFFICERS

An Air Ministry Order (A.304/35) introduces revised conditions of service for Officers of the Dental Branch of the Royal Air Force, the main changes being summarised below.

The scales of pay of officers of the rank of Flight Lieutenant and Squadron Leader have been increased as from October 1. A number of appointments will be upgraded thus enhancing the promotion prospects of officers holding permanent commissions. The rates of gratuity for officers holding non-permanent commissions have been increased and are now £350 for three years, £1,000 for six years, and £1,500 for ten years' service.

Provision has been made for further improving the career of Dental officers by raising the compulsory retiring ages for Group Captains and for Wing Commanders and below to fifty-seven and fifty-five respectively. Provision is also made for the first time for the retired pay of a Group Captain, the maximum rate being £724 p.a.

Applications for appointment should be addressed to: The Secretary, (D.M.S.), Air Ministry, London, W.C.2.

HALTON INSPECTION

The following are extracts from the report by the Air Officer Commanding, Royal Air Force, Halton, (Air Comdre. J. T. Babington, C.B.E., D.S.O.), upon the occasion of the Passing Out of the January, 1933, Entry (27th) of Aircraft Apprentices. The inspecting officer was Air Marshal Sir John M. Steel, K.C.B., K.B.E., C.M.G.

The apprentices now passing out are the 27th entry to pass into the service on completion of the course of apprenticeship training. Of the 220 originally attested, thirty-six were posted to the Electrical and Wireless School, Cranwell, for training as electricians and wireless operator mechanics. Casualties from sickness and other causes during the three years amounted to nineteen, while six apprentices were transferred to this entry from senior entries, leaving 171 now to pass into the service. As the result of the final examinations, twelve have been classified as leading aircraftmen, 147 as aircraftmen 1st class, and ten as aircraftmen 2nd class. No apprentice failed to qualify.

This is the first entry to pass out who have been trained as Fitters II from the commencement of their course.

The statistics show that 94 per cent. of the entry have attained A.C.1 or L.A/C. standard; this is the highest figure attained by any passing-out entry to date.

The average incidence of sickness of this entry has been somewhat higher than in the case of previous entries. This fact is largely attributable to an epidemic of scarlet fever which occurred prior to the Easter leave period and to the obstinate nature of common colds contracted during the recent months.

LIST OF PRIZE WINNERS.

1st Grand Aggregate:—L.A/A. John Geoffrey Bertram Hartley.
2nd Grand Aggregate:—Sgt./App. John Hugh Lapsley.
3rd Grand Aggregate:—L.A/A. John Vincent West-Stedman.
Educational Subjects:—L.A/A. J. G. B. Hartley.
1st Fitter II.:—L.A/A. J. G. B. Hartley.
Elliott Memorial Prize:—Sgt./App. Donald Conrad Maybury.
Cadetships:—Sgt./App. John Hugh Lapsley, Sgt./App. Donald Conrad Maybury, Sgt./App. Thomas Preston, Sgt./App. Percy Robert Hatfield.
Viscount Wakefield Scholarship:—Sgt./App. J. H. Lapsley.

NAME OF NEW STATION

The new station being constructed near Eastburn will in future be known as Driffield.

POST OFFICE EMPLOYMENT OF AIRMEN AFTER DISCHARGE

It has been decided that, on and after January 1, 1937, only those men who have passed the Royal Air Force educational test for reclassification as leading aircraftmen, or the Navy Educational Test, Part I, or who are in possession of the Army 2nd Class Certificate of Education, shall be eligible for registration for appointments as postmen. The qualifications for other grades of Post Office employment remain unchanged.

USE OF EASTLEIGH AERODROME BY R.A.F. AIRCRAFT

Except in emergency, R.A.F. aircraft are not to use Eastleigh Aerodrome (Airport, Southampton) without obtaining previous permission from the officer commanding the station. This restriction does not apply to Fleet Air Arm squadrons based on Eastleigh. All pilots are to observe the civil flying regulations in force at airports.

R.A.F. ATHLETIC AND GAMES HANDBOOK, 1936

The Royal Air Force Athletic and Games Handbook, 1936, was published during the last week in December. A limited free issue is being made direct on the basis of one copy each to R.A.F. units at home and abroad (except India) and, in addition, a certain number of copies are being sent to the secretary of each of the various R.A.F. sports associations and unions for distribution to members of their committees. Additional copies (price 2s. 6d. each, post free) can be obtained from the N.A.A.F.I. on application. The Sports Board hope that all officers and airmen will support the handbook.

R.A.F. RIFLE ASSOCIATION

The R.A.F. Rifle Association has designed an appropriate badge for members who have represented the service in the inter-services matches during the past three years. Those who have represented the service more than once will receive year-bars to the badges. The badges and bars are now in the process of manufacture and the association is presenting these free to members. To facilitate the distribution, those entitled to such badges and bars should make early application to the Honorary Secretary, R.A.F. Rifle Association, R.A.F. Reception Depôt, West Drayton, Middlesex.

ELECTRICAL AND WIRELESS SCHOOL

The following are a few main points from the report by the Commanding Officer, Electrical and Wireless School, Cranwell, at the Passing Out Inspection of the January, 1933, entry of Aircraft Apprentices. The inspecting officer was Air Vice-Marshal C. S. Burnett, C.B., C.B.E., D.S.O.

The original strength of the entry now passing out was thirty-five. Of these, twenty-five were placed under training as wireless operator mechanics and ten as instrument makers. One apprentice was discharged from the Service, and two were transferred from the previous entry. The final numbers for the entry were therefore twenty-six aircraft apprentices under training as wireless operator mechanics, and ten aircraft apprentices under training as instrument makers.

The twenty-six aircraft apprentices now passing out as wireless operator mechanics have qualified as follows: Two as leading aircraftmen, sixteen as aircraftmen 1st class, seven as aircraftmen 2nd class, and one has failed to qualify.

The ten aircraft apprentices now passing out as instrument makers have qualified as follows: One as leading aircraftman, six as aircraftmen 1st class, and three as aircraftmen 2nd class.

It has been decided to commence the publication of a School Magazine with the object of maintaining a link with past and present members of this School. It is proposed to make bi-annual issues, the first number of which should be ready for issue in January.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captains.—A. Shekleton, D.S.O., O.B.E., to No. 7 Flying Training School, Peterborough, to command, 16.12.35. D. G. Donald, D.F.C., A.F.C., to R.A.F. Staff College, Andover; for duty as Instructor vice Air Comdre. A. A. Walser, M.C., D.F.C., 13.12.35.

Wing Commander.—E. B. Beauman, to Headquarters, Central Area, Abingdon; for duty as Senior Personnel Staff Officer, 16.12.35.

Squadron Leaders.—E. D. H. Davies, to No. 36 (T.B.) Squadron, Singapore; to command vice Sqn. Ldr. T. A. Langford-Sainsbury, D.F.C., A.F.C., 21.10.35. F. L. Pearce, to No. 824 (F.S.R.) Squadron; to command vice Sqn. Ldr. W. A. K. Dalzell, 26.10.35. A. R. Wardle, A.F.C., to No. 11 (B) Squadron, Risalpur, India; to command vice Sqn. Ldr. C. F. le Poer Trench, 15.11.35.

Flight Lieutenants.—E. Dawson, to No. 7 Flying Training School, Peterborough, 16.12.35. A. V. Hammond, to No. 23 Group Headquarters, Grantham, 12.12.35. C. H. V. Havman, to Home Aircraft Depot, Henlow, 16.12.35. F. A. J. Pollock-Gore, to No. 15 (B) Squadron, Abingdon, 16.12.35. D. L. Thomson, to No. 5 Flying Training School, Sealand, 16.12.35.

Flight Lieutenants.—T. M. Abraham, to No. 28 Army Co-operation Squadron, Ambala, India, 25.11.35. W. J. Crisham, to Aircraft Depot, Karachi, India, 17.11.35. E. C. Hudleston, to No. 2 (Indian Wing) Station, Risalpur, 20.11.35. W. H. Jones, to Headquarters, R.A.F., Iraq, Hinaidi, 12.12.35. M. B. Mackay, to No. 1 (Indian Wing) Station, Kohat, 16.11.35.

Pilot Officer.—G. A. V. Clayton, to No. 203 (F.B.) Squadron, Basrah, Iraq, 12.12.35.

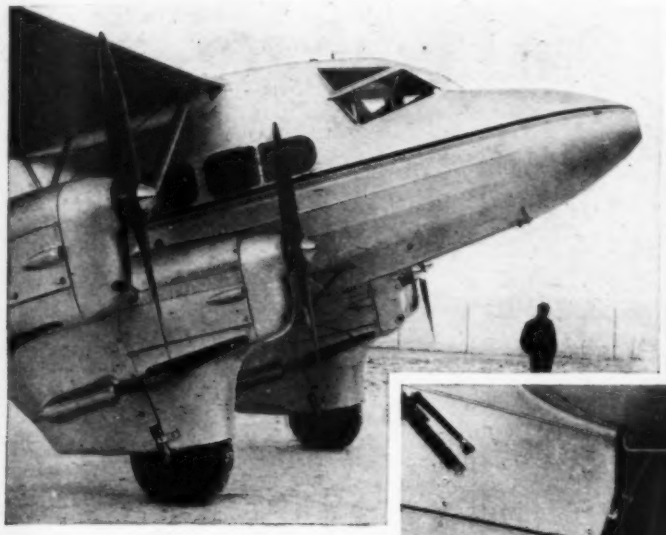
Flying Officer.—R. G. Harman, to No. 7 Flying Training School, Peterborough, 16.12.35.

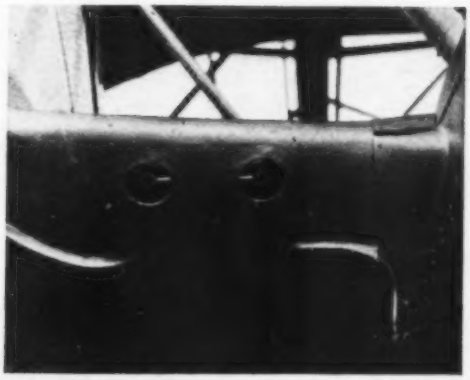
Stores Branch

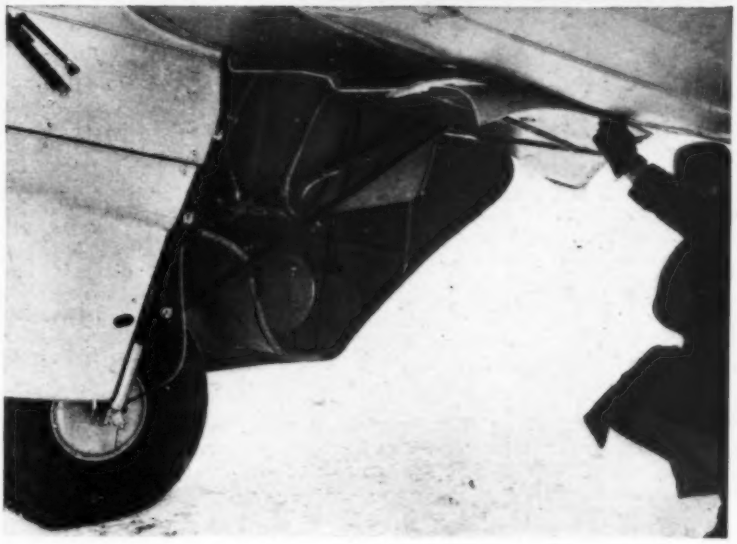
Pilot Officer.—H. M. C. Harwood, to R.A.F. Station, Upper Heyford, 14.12.35.

"EXPRESS" REFINEMENTS

Interesting Features of the D.H. 86a Types: 1936 Versions of the Popular De Havilland Express or D.H.86







THESE photographs, secured by *Flight's* photographer at Hatfield, show some of the features of the first D.H.86a. Two versions of this type are actually being produced, one with standard Gipsy Six engines and wooden airscrews, and the other with Series II "Sixes," driving De Havilland controllable-pitch airscrews. These pictures show the former model. In the top left-hand view may be seen the muffs on the exhaust pipes for cabin heating purposes, the top right-hand view shows venturis mounted within the leading edge, and the bottom picture is of one half of the undercarriage which now embodies Turner compressed-air shock-absorber struts, more powerful brakes, and reinforced tyres. The disposable load of the machine as shown is 4,110lb., whereas that of the previous 86 was 3,680lb. These refinements were dealt with in *Flight* of October 31.

MORE NEW BOOKS

Jane's All the World's Aircraft, 1935. Edited by C. G. Grey. Compiled by Leonard Bridgman. Price two guineas net, Sampson Low, Southwark Street, London.

THE task of keeping a finger on the pulse of world aviation is considerably lightened by a study of *Jane's All the World's Aircraft*. With the latest edition of this work, which has just been issued, twenty-five years of publication have been completed.

Year by year those responsible for its production are compelled, through limitations of space, to eliminate such material as becomes obsolescent. They substitute particulars of up-to-date aircraft and engines, and appropriate information on civil and military flying. The result is a first-class work of reference which becomes, in due course, of great historical interest to the student of aeronautics.

This year's "Jane's" is laid out on similar lines to its immediate predecessors, which means that there are sections devoted to noteworthy flights, international records and markings, progress in civil and service aviation, and to the world's aeroplanes, aero engines and airships. According to the introduction Mr. Leonard Bridgman, the compiler, is of the opinion that the first of these features is now redundant, as aviation is becoming a stabilised method of transport and trade, and is no longer a field for stunts. The feature has been retained, however, for this year.

Jagdstaffel 356. By M. E. Kahnert. Translated from the German by Claud W. Sykes. (John Hamilton, Ltd., 3s. 6d. net.)

A SLIGHT book which professes to give some pictures of life in a German fighter squadron during the last year of the war. It cannot be called a history of the squadron, for it starts near the end of the story, and there is nothing consecutive about the incidents in the various chapters. There is no preface to give an idea of the scheme of the book, but it might have been written up from incidents in the diary of one of the pilots—though incidentally there is no central figure or "hero." Some of the photographs suggest that actual incidents are described, but some of the incidents suggest the exaggeration of a heated intellect.

One word of praise may be given to the book. It is intensely fair. It does not represent the Germans as always victorious, and it gives high praise to the bravery and chivalry of British and American pilots. The author thus displays his own chivalry.

Private Flying

Topics of the Day

The Forced-Landing Complex

MOST of the original light aeroplane club pilots, who were, for the most part, taught by the hard-boiled school of ex-war pilots, continue to make all their cross-country flights with one eye, so to speak, on the look-out for forced-landing places. Possibly the present-day club pilot suffers, too, from what can only be called a forced landing complex, but engines are so supremely reliable now that the chances of a really sudden failure are very remote.

Certainly, complete confidence makes for more pleasureable flying, and I often regret the fact that at least half my thinking brain is devoted, during a flight, to the study of fields and more fields, of wisps of smoke from cottages and factories, of oil pressures, and of revolution indicators. The slightest imaginary change in exhaust or engine vibration tempo causes me to scan the instruments anew.

Nerves, perhaps. But part of my original training was done under an instructor who had once made no fewer than five (or was it six?) forced landings on a hundred-mile flight with a Mono-Avro in 1917. Those were the days, apparently, and I was then inculcated with a temporary terror that I should be unprepared for the emergency when and if it came, and that, in any case, I should undershoot. Hence the heavy sideslip approaches, shaving the top of the boundary fence, carried out by so many amateur pilots at mile-long aerodromes. Every landing a forced landing, in fact.

Modern Problems

ENGINE reliability has hurried along the development of some of the modern types on which a normal forced landing requires the exercise of a different kind of skill. Mr. X's Mono-Avro could be pointed quite steeply down towards a field without reaching a really excessive speed, and the act of flattening-out—plus the addition of a little swish-tailing—would bring the speed down almost at once.

Nowadays, with cleaner aeroplanes, the air speed must be kept within rigid limits or the machine will be touching down on the hedge at the end of the selected field and finishing its run with its nose in the next hedge. My first attempt to land a cabin machine at a strange and small aerodrome was an abject failure simply because, being engrossed in a study of the masonic signs and symbols to be seen thereon, I allowed my air speed to creep up to 80 m.p.h. when I had been firmly told to glide in at 65 m.p.h. or even less.

All of which puts me back on my favourite sugar box, extolling the virtues of really efficient air brakes. Why should the ordinary man be expected to bother to practice approaches for a dozen hours in, for instance, a tricky aeroplane with a flat high-speed gliding angle and with a pronounced sink at low speeds? The permutations and combinations of wind speed and machine speed are unlimited, and, if he develops the habit of coming in short, and motoring over the intervening distance, he is risking the possibility that his engine will fail him. The best of engines go cold during a prolonged glide.

Safe Fields

NEVERTHELESS, in a reasonably old-fashioned (or very new-fashioned) aeroplane with an honest-to-goodness undercarriage, a quite amazing number of ordinary fields can be used with safety, though one's insurance company might not think so. Friend X, the instructor, never doubted his ability to get into or out of any of the fields chosen.

During a forced landing try-out three years ago, I put down in five different fields, none of which I had ever seen before. Admittedly, the instructor craned his neck and bobbed up and down quite furiously during the last ten seconds of the approach, but in the ordinary way I should have flown up and down each field several times before daring to trust an aeroplane thereon.

It is possible that this instructor knew two out of the five, but when he closed the throttle suddenly he could hardly have been certain that I should choose any particular one with two thousand feet to play with, and a vast number of likely fields to examine. Out of one of the five it was necessary for him to take the machine off in the sort of steep climbing turn that I should never have dared to make, and that landing might have meant a little aircraft dismantling for the less confident pilot. There was never any trouble with the surface conditions.

If One Must . . .!

THE most pronounced ability to pull off forced landings will not, of course, always save the day. Since engines are most likely to fail just after the take-off—through carelessness in the matter of petrol taps and the like—I sometimes think that early solo circuits constitute the least safe hours of a pilot's life.

One rule has always been hammered into us: Never turn back. But there are times when to glide, however slowly, straight ahead, is to ask to be carried away in an ambulance. When one simply must crash there are very few available seconds in which to decide how to crash without suffering any great personal damage, and I should choose to let a wing tip take the brunt of an impact if at all possible.

Incidentally, a tight harness may save one from facial damage in quite a minor landing mishap, and I never fly in anything without strapping myself in—if straps are provided. During one trip on a big transport machine I was partially stunned by the luggage rack in a particularly fearsome bump over the coast. An unattached pilot might have gone clean through a celluloid roof.

INDICATOR.

FROM the CLUBS

Events and Activity at the Clubs and Schools

C.A.S.C.

Twenty-four members attended at Fen Ditton on December 22, and fifteen of them put in five hours' dual and 3½ hours' solo.

BORDER

Six soloists are gaining the experience necessary for "A" licences. Up to December 20, 31 hr. 20 min. flying had been recorded during the month.

LANCASHIRE

The Club's flying time suffered from the inclemency of the weather during the week ending December 18, but a certain amount of instructional and solo flying was done. Miss J. P. Denton, and Messrs. Brown, Gibson, Herbert, Wilton and Tyson became members.

YORKSHIRE

Club aircraft flew 14 hr. 45 min. during the week ending December 21 in spite of a snow-covered aerodrome and extremely cold weather. Mr. H. Priestley, a pupil of the Air League Young Pilots' Fund, went solo, and Mr. J. Nixon, an Aviation Group member, passed his "A" licence tests. The Praga Baby visited Yeadon on December 18.

BROOKLANDS

A new member, Mr. M. V. Bertram, late R.A.F., joined the other week and put in the time necessary for an "A" licence in order that he might proceed on a flying honeymoon. Mr. Donaldson, an instructor of the Northampton Club, arrived by road, complete with a pair of pupils, and gave instruction at Brooklands as weather was unfit at his own aerodrome. The Tramps Party is best described as a howling success.

KARACHI

A total of 178 hr. 50 min. flying was recorded by the Karachi Club during November. Five members were being trained during that month for their "B" licences, two for their "A-1," and one for his "A" licence. Mr. E. Sequeira has passed the technical examinations for his "B" licence, and Mr. K. J. Thouless, Director of Posts and Telegraphs, Sind and Baluchistan, has qualified for his "A" licence. Mr. N. G. Gadgil, and Mr. S. G. Pathak, who were trained by the Club, have been engaged by Tatas as pilot and ground engineer respectively.

CINQUE PORTS

Flying time was greatly reduced during the week ending December 22 by an almost daily visitation of fog and low cloud. While this made the Club rather quiet, the airport itself had several days of almost feverish activity. Mr. Dupe dealt most efficiently with the passengers and crews of two Rapides, two Douglases, an H.P. 42, a brace of Junkers, four D.H. 86's, a Wibault and a Fokker, which all arrived in one day because there was fog at Croydon. The Christmas Dance was held at the Leas Cliff Hall, and Mr. Georges Seversky came from Paris by Imperial Airways and entertained with some of his songs.

SCOTTISH

During December, 115 hr. 35 min. flying was recorded. Although no "A" licences were obtained, there are quite a number of pupils well on their way towards them.

RANGOON

Due to the absence of the chief instructor in connection with the inspection of the new R.A.F. emergency landing grounds in Burma, the flying times for November totalled only 34 hr. 55 min.

REDHILL

There was one new member during the week ending December 23, and Messrs. R. F. Stone and R. Frost took their blind-flying certificates. Flying time was 50 hr. 25 min. During the following week the total was 36 hr. 10 min. Mr. D. T. Low made his first solo and Mr. G. G. K. Browne went solo on the Autogiro. The turkey dinner held on Sunday, December 22, was a great success, about seventy members and their friends being present.

HANWORTH

Mr. T. Wood left Hanworth in Mr. Anson's Rapide for Zurich, carrying Mr. Anson and family, but was unable to get any farther than Paris, owing to the prevalent bad weather.

New members of the London Air Park Flying Club are Miss Maclaren and Messrs. Bailey, Hopkinson and Shaw. During the week ending December 28 flying times totalled 12 hr. 10 min. Mr. Valentine became a member.

CARDIFF

On Christmas Day Father Christmas arrived by air to distribute presents to forty children of Club members, and afterwards to a number of poor children of the district. Three days later a farewell supper was given in the clubhouse to F/O. W. N. L. Cope, the chief instructor, who left at the end of December to take up an appointment with the Bristol Aeroplane Club at their new Reserve Training School at Yatesbury. Flying time for the week ending December 23 was 2½ hours.

HESTON

Flying Officer A. M. Glover is, as already reported in *Flight*, to join the Airwork School of Flying at the beginning of March, as assistant instructor to Mr. B. A. Davy. It will not be the first time that these two pilots have worked together, for both were in the same flight in the Royal Canadian Air Force.

Colonel Toeplitz, formerly on the management of London Film Productions and now running a film business under his own name, heads the list of three first solo flights made at Heston during the week ended December 20. He was introduced to Heston by Capt. E. Trigona, the late Italian Air Attaché, who is a flying member of the Airport Club. Other first soloists are Mr. Louis Veber and Miss Margaret Templeton.

A Gipsy VI Falcon is the choice of Mr. A. N. T. Rankin and his wife, Lady Jean Rankin, who have handed in their Leopard Moth in part exchange. They learned to fly—and soloed the same day—at Heston.

PRACTICAL PROOF: On December 20 Mr. Robert Kronfeld delivered a B.A.C. Super Drone to Holland and flew well over 200 miles non-stop in the process. He left Hanworth at 10.30, cleared Customs at Croydon and landed eventually at Zierikzee, some twenty miles from Rotterdam. The weather was foggy and cold, but, with the new exhaust-warmed induction system, no trouble was experienced. In this photograph the Super Drone is being demonstrated by Mr. Kronfeld at Schiphol, Amsterdam.

Private Flying

BENGAL

The creditable total of 113 hr. 10 min. flying was logged by the Bengal Flying Club, Ltd., during November. Princess Ila Devi of Cooch Behar, and Messrs. A. P. Chakraburtty and H. Pohle passed their "A" licence tests, and Dr. P. Piekenbrock started taking dual instruction. Mr. M. Ukil-Banerji went solo.

NEWCASTLE

Snow and a considerable amount of fog during December kept flying time down to 57 hr. 45 min. A total of 1,539 hours were flown from January 1 to December 28. On Sunday, December 22, Mr. T. C. Pick, an old member of the Club, called in at Woolsington with the demonstration Praga Baby. A Beechcraft was another visitor.

READING

Every room in the clubhouse was taken for Christmas, and the resulting party was a gay and happy one. Visitors to the Club included Messrs. Clapham and Dwyer. Mr. Vishvarath qualified for his blind-flying certificate, and Miss Gill Muir, Mr. Peter Godfrey, and Mr. M. W. Lewis became pupils. The service hangar is coping well with the great increase of flying time due to the activities of the Reserve School, and is being extended in consequence. Congratulations are due to the personnel of the fire-engine, who, in an entirely surprise practice drill the other day, reached a bonfire at the other side of the aerodrome sixty-five seconds after the alarm had sounded. Extensions to the experimental hangar are now complete, and there are additions to the drawing offices and reception rooms.

CAMBRIDGE

Fog prevented any flying on the majority of days in the week ending December 21. Flying hours were cut down, in consequence, to 23½. Messrs. Johnson and Howard managed to complete their "A" licence tests.

Fog persisted during the following week, but Messrs. Molyneux, Fletcher and Roberson were putting in as many hours as possible in order to take their "A" licences. Two charter trips had to be cancelled.

Another "Pou" Club

A FLYING FLEA club has been recently formed in Sleaford, Lincolnshire, under the name of the "Sleaford Flying Club." Although not at present strong numerically, the members are very enthusiastic, and three are at present working on their machines. Those interested are invited to communicate with Mr. W. R. Earl, the secretary, the Sleaford Flying Club, Church Lane, Sleaford, Lincs.

At Sutton Bank

FOUR special meetings have been arranged by the Yorkshire Gliding Club for 1936, and plans have been made whereby an instructor will be at Sutton Bank continuously during the summer—between June 1 and September 30. During the first two months of the year it may be possible to arrange for a special series of lectures on design and pilotage, and, if sufficient support is forthcoming, special theoretical and practical instruction in thermal and cloud flying will be given during the summer.

The "Specials" include a meeting for members at Easter, an open event during Whitsun, an open meeting during the August Bank Holiday week-end, and another open meeting with a series of competitions during the last fortnight of August. It is possible, but not certain, that the last will include the 1936 National Contest.

A Homing Device in Canada

NOW that the use of homing equipment and radio compasses is rapidly becoming almost a commonplace it has been interesting to hear of tests which have been carried out by Canadian Airways with a Lear direction finder.

During November of last year a 1,500-mile flight was made from Winnipeg over a circuit of prairie cities, including Regina, Moose Jaw, Saskatoon, Prince Albert, terminating at Winnipeg, on which flight neither maps nor a magnetic compass were used by the pilot. The weather encountered during the week's flight was, at times, anything but favourable, many of the flights being made in conditions of extremely poor visibility, accompanied by snow flurries, and with temperatures ranging from 28 deg. to −10 deg. The pilot was Mr. H. R. McLaughlin, manager of the radio division of Canadian Airways and also of the radio division of James Richardson and Sons. He was accompanied by Mr. W. B. Burchall, the advertising-publicity manager of Canadian Airways.

The Lear equipment may be employed as a regular radio receiver, or, at the same time, as a visual type of homing device by which the aeroplane may be directly and accurately steered toward a distant radio station. In addition to the direction finder on the dashboard there is also an automatic indicator which is always operating, and this shows on a separate dial the approximate distance from the broadcasting station as the machine approaches its immediate vicinity.

With it the pilot may use the radio beam, which, in the past, has been the generally recognised method of direction-finding on organised Canadian transport routes; may receive broadcasts if within range, from any of the hundreds of stations throughout the Continent; may receive weather reports issued by meterological stations on short waves; and may maintain contact with Company's short-wave telephone stations. During the period of Prairie Air Mail operation, four radio beam stations were utilised on the route between Winnipeg and Edmonton. When the air mail service was discontinued these beacons were dismantled. The use of these stations was limited to pilots flying within the width of the beam on the Prairie Mail run. With a homing device the pilot may use any broadcasting station throughout the Dominion of Canada or the United States provided that he is within receiving range.

Subsidy Increase in South Africa

FLYING clubs in all the larger centres of South Africa are making rapid progress. This is due in no small measure to the encouragement given by the Government. Recently the Minister of Defence announced that the Government would spare no expense to encourage South Africans to fly, and it has now been decided to increase the subsidy paid to pilots and clubs.

Under the new scheme the Government will give £20 to the club and £10 to each pupil who obtains his "A" licence; a further £15 will be given to the club, and £15 to the pupil when he has fifty hours flying to his credit; and a further £10 will be awarded to the club and £40 to the pupil who qualifies for the Air Force Reserve. Another £50 will be given to the pupil under arrangements which have not yet been decided upon—probably when he joins the Special Reserve.

Hatfield in Piccadilly

AN ability to fly on instruments was hardly useful to those members and guests of the London Aeroplane Club who approached the Park Lane Hotel by road from afar for the annual dinner and dance. However, almost everybody eventually arrived, and few people worry very much about the fact that, in due course, it will be necessary to return by the same route.

The London Club is to be congratulated on being one of the few at whose functions speeches—good and bad—are not encouraged. In fact, on December 20 there was but one toast and one speech, though Mr. Vivian Holman addressed apposite and amusing remarks to a microphone during the presentations. The toast, of course, was the loyal toast, and the speech consisted of a brief résumé of the year's work and was delivered by the chairman, Major K. M. Beaumont.

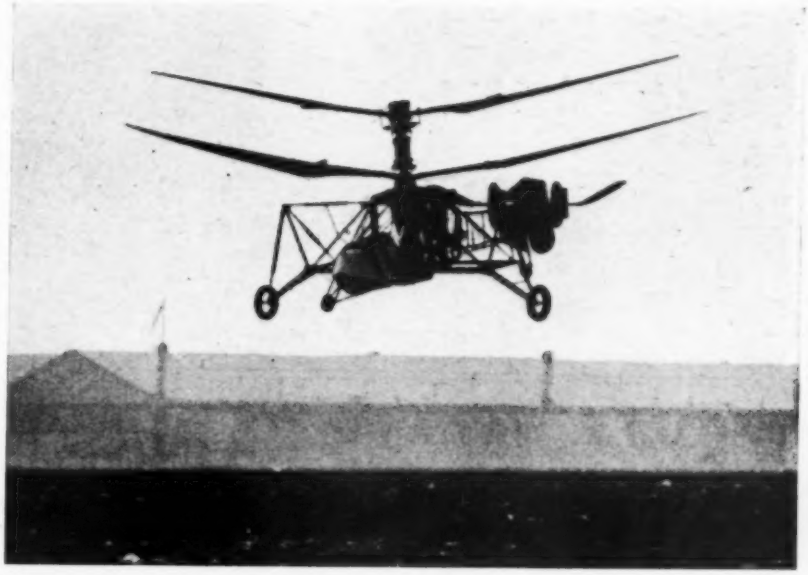
He explained that 3,380 hours had been flown until September, showing an improvement of 480 hours on the previous year's figure; that forty-eight licences had been obtained and forty-two had been renewed; that, of the 381 members 125 had joined during the year; and that there had been nine machines in action.

The evening's highlight, of course, was the draw for the Gipsy II Moth. This machine was won by Mr. G. N. Lamnahan, of The Mount, Stonehouse, Gloucestershire. Four "hats," representing the four digits of a maximum winning number, were used, and the figures were chalked on a blackboard one by one so that those persons holding a ticket with a number similar to that of the winner suffered all the greatest pangs of pleasant suspense. It can only be hoped that the mathematician who worked out the different number of noughts to be placed in each "hat" did not make a slip in his calculations! Thereafter, several people received consolation prizes which were separately drawn. One winning member was hardly consoled, since he had lost his ticket!

The cups for the various flying competitions had already been presented. Mr. Mark Young won the particularly beautiful navigation trophy presented by Mr. E. Hicks; Mr. A. Auping won the map-reading trophy presented by Mr. F. H. Matusch; Mrs. Crossley won the aerobatics trophy given by Mr. P. H. B. Sprosen; and Mr. Mark Young won his own forced-landings trophy.

A HELICOPTER'S ACHIEVEMENTS

Some Convincing Flying Performances by the Breguet Gyroplane in Quest of Further Prizes



There is no doubt, in this photograph, about the Breguet gyroplane being completely air-borne and, as they used to say in the old days, "in full flight." A speed of 62 m.p.h. has been attained.

CONTINUING its successful trial flights for the performance prizes offered by the Air Ministry (it has already won a prize of a million francs), the Breguet-Dorand gyroplane (described in *Flight* of December 19) accomplished a series of speed tests at the Villacoublay Aerodrome on Saturday, December 21. Favoured by fine weather, with but a 5 m.p.h. wind prevailing, this extremely unconventional machine flew over a straight course of 885 metres in 32 sec. at an altitude of about 35 ft. This is equivalent to 99 *km/h* (approximately 62 m.p.h.). On the preceding Saturday, as already reported, the machine had flown over a closed circuit of 500 metres (1,625 ft.), maintaining an average height of about 100 ft.

It is now possible to give some additional details regarding this gyroplane. The example which made these trial flights is but a "laboratory trial machine" which has been constructed to test out some new principles and theories evolved by its constructors. The various parts have been constructed with very large coefficients of security and a number of recording instruments have been installed, thus increasing the weight of the machine some 600 to 700 *kg* (about 1,500 lb.), with accompanying parasitic drag absorbing about 90 h.p.; all of this "lumber," it is calculated, can be shortly dispensed with.

The gyroplane, as at present constituted, weighs about 2 100 *kg* (slightly over 2 tons). The diameter of each of the rotor blades is 16 metres (52 ft.). The single spar and ribs are constructed of duralumin, the leading halves being covered with duralumin sheet and remainder fabric covered. A stainless steel sheathing is used to form the leading edge. The total blade surface is 12 sq. metres, which represents 6 per cent. of the surface swept by the rotors. In the recent trial flights the rotor blades turned at 132 r.p.m., being geared at a ratio of 16.7 to 1. The lift of the machine is 3 250 *kg* (7,150 lb.).

The framework of the gyroplane is constructed of steel and the engine mounting of duralumin tubes, electrically welded. The interior structure of the tail surfaces is similar to that of the wings. The vertical fin is covered with plywood, and the rest of the empennage fabric covered. The ends of the horizontal stabilisers are upturned, with sharp dihedrals.

The Power Unit

An Hispano-Suisa nine-cylinder radial air-cooled engine is employed, rated at 350 h.p. at 2,450 r.p.m. During the test flights, however, the engine ran at only 2,000 to 2,100 r.p.m., thus furnishing about 240 h.p. It is mounted in the forepart of the gyroplane and equipped with a ventilating fan. The pilot's seat is now installed behind the rotor pylon, but it is intended eventually to place it before the engine in the front part of the machine.

At the end of the trial flights on Saturday, December 21, the pilot, Claysse, attempted to make a banked turn after having reduced the speed of his engine to 1,200 r.p.m. The lift of the rotor blades was thus reduced and their path altered, so that the tip of one of the upper blades touched that of one of the lower, cutting it off. While this damage is but slight, it will probably delay additional trial flights for a short time.

R. C. W.

Next Monday's R.Ae.S. Lecture

THE next R.Ae.S. lecture is on Monday, January 6, when Mr. J. E. Hodgson, Hon. F.R.Ae.S., will talk on Sir George Cayley as the founder of modern aeronautical science. The lecture will be given at the Institution of Electrical Engineers, Victoria Embankment, London, 6.30 p.m. Visitors will be admitted only by ticket obtainable through a member of the Society.

Brooklands Beanfeast

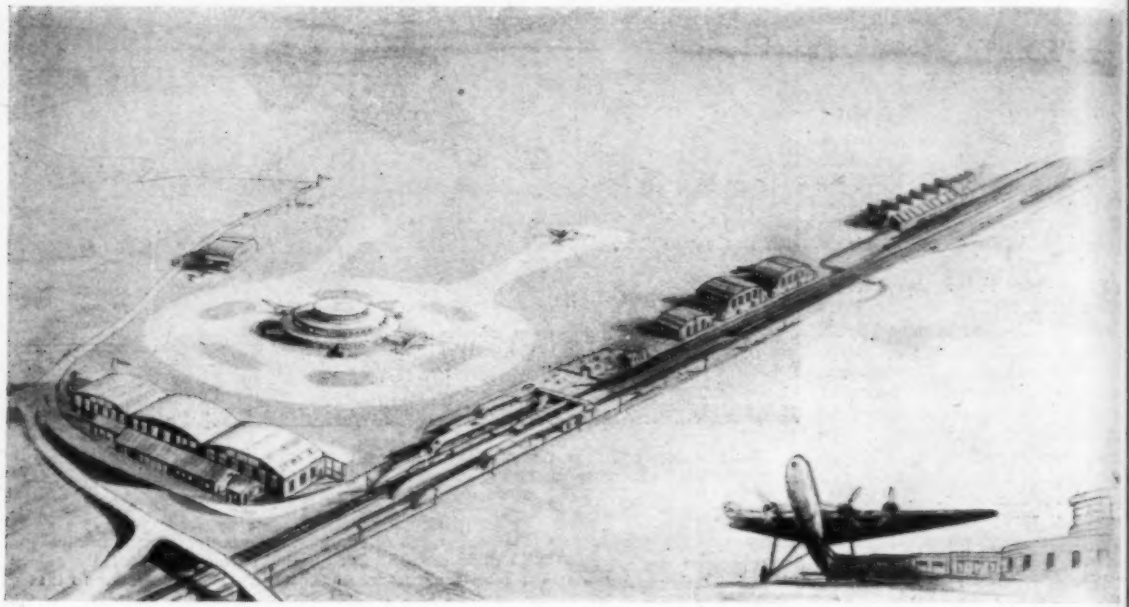
FOUR thousand five hundred hours' flying, seventy-five "A" and four "B" licences during a year; such achievements call for something hearty in the way of celebration and thanks to those responsible. Both were forthcoming in no meagre measure at the annual works' dinner of Brooklands Aviation, Ltd., held at the Ship Hotel, Weybridge. The total of the year's flying time at Brooklands is actually well over 1,000 hours more than that for last year.

The non-arrival of a substantial contingent from Northampton was regrettable, particularly in view of the hard work put in at the Reserve Training School up there, but the other aerodromes associated with Brooklands—Shoreham and Lympne—were well represented. Few and to the point, the speeches were distinctly optimistic for the new year and, judging from the reception accorded Capt. H. Duncan Davis and Mr. J. W. Massey, the teamwork, the importance of which was emphasised by Flt. Lt. Max Findlay, will not be lacking.

At the moment forty people are in training at Brooklands for their "A" licences and eight for their "B's," while five are studying for their Second-class Navigators' Certificates. Something like seventeen are taking courses in blind flying.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



MORE THAN AN ALTERNATIVE AIRPORT: Gatwick as it will appear when complete. The new station, in the foreground, and the "Martello Tower" administrative building will be connected by means of a subway and landing runs vary from 1,000 to 1,200 yards.

THE WEEK AT CROYDON

Christmas Bookings : Being Prepared : The Need for Fog Approach Equipment : Quickly from Australia : Hoping for the Worst

CHRISTMAS brought the usual rush before the holiday and most of the services from Croydon were fully booked. Then, during the actual days of festivity, there was something of a slump, and afterwards the rush commenced again. The London-Zurich service, for instance, has been fully booked day after day and Swissair Douglas machines never appear to have an available seat. Imperial Airways report full bookings to Zurich for some time ahead.

On Sunday last M. Mesmer, the Swissair manager, took a Douglas round to a number of aerodromes which might act as harbours of refuge in bad weather if they were all adequately equipped for the purpose. *Flight* has often stressed the fact that, if they are to be really valuable, alternative airports should be as well equipped for bad-weather use as the terminals. M. Mesmer was very wise to make such a tour with one of his pilots, for it is no joke getting any big machine into a strange aerodrome in really bad weather. Whilst he was about it M. Mesmer gave demonstration flights at the various places, for he, like everyone using the Douglas, is convinced that you only have to fly once in one of these machines to become an enthusiast.

Capt. "Jimmy" Youell, of Imperial Airways, made a quick return flight to Basra and back in the Vickers Velox, carrying a full load of Christmas mail both ways. He took ten days for the round trip and landed at Croydon on Christmas Eve. One of his crew (it would be unfair to say which, because the unfortunate man does not want a continual stream of callers knocking at his door) found on arrival in Paris that he had won a prize in some sweepstake. This proved to be a gargantuan bottle of Cognac some four feet high and stout in proportion. When asked if he had anything to declare at Croydon, he is said to have produced his prize, with the remark that "he had his little hip flask with him."

Airport people anxiously searched their stockings on Christmas morning to see if Uncle Gwydyr, or, perhaps, Aunty Adastra, might have presented them with a radio beacon for Croydon. Recently there have been many days when machines could have got in with such a beacon, but were compelled to go elsewhere for lack of this "every-day" facility.

The other day I heard from a junior foreign pilot, of one of the countries where radio beacons at terminal airports are taken as a matter of course, that during instructional lectures young pilots are always warned that at Europe's most fogbound national airport the facilities are so primitive that a totally different flying technique is necessary. Pleasant hearing, is it not? By the way, there is a pretty yarn, which has the virtue of being true, of a D.L.H. pilot who approached Berlin flying high and found his windscreen frozen up solid and with visibility through it about equal to that through a frosted-glass bathroom

window. Rather than hang about waiting for the ice to melt, he landed, and that perfectly, by the Lorenz system. At Croydon the equivalent system would consist of lowering the first officer on a rope to look for the chalk line.

Mr. Schmidt-Rex, who has been on a two-months' intensive business tour of the United States on behalf of D.L.H., is now back at Croydon. Like all intelligent people who have recently been to America, he has returned convinced that there is no bluff about the air-line systems over there, which, he says, in confirmation of Mr. Plesman, the K.L.M. director, who has also recently visited the States, are admirably and efficiently operated.

Just before Christmas, operating firms used to be inundated with small parcels containing all sorts of small Christmas gifts liable to make the maximum Customs clearance work for a small and almost valueless consignment. In these days, however, most of the small parcels tend to go by parcel post *via* the G.P.O., Mount Pleasant, where the Customs regulations are less severe. The carrying company obtains its share of the revenue and is relieved of much troublesome work.

Capt. "Bill" Ledlie, of Olley Air Service, had an "Iraqi" Christmas card from Comdr. Scholte and the crew of one of the eastbound K.L.M. machines. It came back by Imperial air mail in very quick time. Ledlie and Scholte are old friends, having toured Europe with a D.H.86 and a Douglas respectively some time ago. Mr. D. S. Wyles, of the Phillips Lamp Works, Sydney, Australia, recently made a remarkable flight to Emdhoven, Holland, through the co-operation of Qantas and K.L.M. He left Brisbane by Qantas on November 20 and arrived at Batavia, where, after a wait of an hour and three-quarters, he picked up the K.L.M. machine for Amsterdam, arriving in Holland (at Emdhoven by local air connection) on the 29th. He is going back the same way. The journey time by means of these combined services is 3½ days between Brisbane and Batavia, and 5½ days between Batavia and Amsterdam.

Olley Air Service reports quiet but steady traffic over Christmas, a number of flights having been made to Le Touquet and similar places. The managing director of British Continental Airways informs me that on the survey flight, *via* Germany to Scandinavia, the chief pilot, Mr. Morton, and the wireless operator, Mr. Hamblin, were shown the Lorenz system in operation at Berlin, where it was seen and described by a *Flight* representative in January of last year. On the first day the German pilot stated that the weather was not bad enough, and waited until the following morning, when it was really thick! This reverses the usual procedure of "awaiting better weather."

A. VIATOR.

Ratmalana in Use

CEYLON'S aerodrome at Ratmalana, near Colombo, has been used for the first time. A crowd witnessed the arrival of a member of the Madras Flying Club who, accompanied by two passengers, flew from Madras to Ceylon.

Viceregal Transport

AN agreement has been reached between the Government of India and Indian National Airways, under which I.N.A. are responsible for maintaining and operating H.E. the Viceroy's four-engined Avro 642 *The Star of India*. Under the same agreement Indian National Airways will also continue to maintain and operate the Government of India's triple-engined Avro Ten.

A Misr Airwork Extension

A NEW service has been opened by Misr Airwork between Alexandria, Port Said, Cairo, Minia and Assuit for the benefit of the cotton fraternity and to enable passengers to fly direct from Alexandria to Palestine. This is made possible by the connection at Port Said with the Cairo-Haifa service. The Upper Egypt service will not be immediately reopened since the international situation has played havoc with the tourist industry.

A D.H. Trio for Turkey

UNDER their three-year plan to connect the more important towns by air services, the Turkish State Airway Exploitation Administration, which is virtually an offshoot of the Turkish Ministry of Transport, has ordered three De Havilland Rapides. These they will put on a service between Stamboul and Ankara (or Angora), calling en route at Eskishir.

The machines will be seven-seaters, will have lavatory and luggage compartment, and are to be fitted withh Marconi wireless equipment—the first British wireless apparatus to be specified in a Turkish aeroplane. The Rapides will form the nucleus of a large fleet, additional units of which are soon to be ordered.

Illuminations at Blackpool

ON behalf of the Air Ministry, Major Mealing and Mr. Courtney held a private interview with representatives of Blackpool Corporation on December 18 with regard to the two aerodromes, owned by the Corporation, at Stanley Park and Squires Gate. The local authorities propose to make one of the aerodromes into a "Class A" airport, complete with night landing facilities.

As a result of the interview, the Squires Gate ground is to be surveyed in order to find if it is suitable for the purpose. The Corporation are negotiating with Blackpool and West Coast Air Services, who operate from Squires Gate, for the acquisition of the lease.

Lockheeds for "Lot"

FOUR new Lockheed Electra 10A machines have been bought by Polskie Linjie Lotnicze ("LOT"). They will be put into service on the mail and passenger routes which serve the area from the Baltic to the Aegean sea. The first machine of the batch was delivered to Polish officials at New York on December 3, and was shipped to Poland. Delivery of the remaining three will be made immediately. Wasp Junior engines of 400 h.p. are specified for the machines, each of which carries ten passengers, two pilots and 500 lb. of cargo. The cruising speed, on 75 per cent. power, is 195 m.p.h.

Zeppelin Transatlantic Plans

IT appears now to be certain that the L.Z.129 will be ready to take the air before March and that work will be started on another ship, the L.Z.130, as soon as the 129 has left Friedrichshafen. Several trial trips, including one between Lakehurst, New Jersey and Frankfurt, will probably be made before she joins the *Graf Zeppelin*, which is now laid up for the winter, on the regular South Atlantic service.

The mention of Frankfurt is explained by the fact that, as reported in *Flight* early in 1935, the D.Z.R. will shortly be making this the European terminus, and a large shed is in course of construction there. In due course, too, the South American terminus will be Rio de Janeiro and not Pernambuco.

Ex-Heston

MR. L. A. LAFONE is to succeed Mr. J. J. Parkes as manager of the technical services department of Airwork, Ltd. He originally joined Airwork as assistant to the service manager in the summer of 1930, and has since served for three years with its associated company in Egypt.

A D.H.89, last of the fleet of seven air liners supplied to Misr Airwork, left Heston on December 13 on its delivery flight. The pilot was Mr. E. G. Parsons, who has for some years been on the instructing and air line staff of Misr- Airwork. He is accompanied by F/O. N. Samuels, who is joining that company as a pilot, and by Mr. Kimberley, who will take up a position as ground engineer, for which he has gained the necessary licences at Heston.

A Mr. Drew has occasioned the latest panic scramble by Heston air taxi. He missed his train, and consequently his boat to America, on a recent Sunday. On the following day he appears to have sunk into comatose meditation on Kismet and the punctuality of British railways, to awake on Tuesday to the fact that the *Majestic* was sailing at noon and that he had missed the train again. Then he bethought himself of Heston, which he reached in twenty minutes from Dorchester House by an epic piece of traffic penetration, there to find Birkett Air Service ticking over on the tarmac. He caught the boat by forty minutes, and should have had no further opportunity of missing anything for five clear days.

Commercial Aviation

The British Continental Extension

SINCE his return from Sweden Sir Percy Mackinnon, the chairman of British Continental Airways, has stated that the extension from Amsterdam to Copenhagen and Stockholm is likely to be open in May. D.H.86s are being built for the service, which will operate via Amsterdam, Hamburg, Copenhagen, Malmö and Stockholm. Bromma airport is expected to be ready in May.

1936 in the U.S.S.R.

ONE of the most important events of 1936 in the U.S.S.R. will be the opening of a regular passenger service linking Moscow and Vladivostok, a distance of over 5,000 miles. Two branch lines will be included in the scheme, one from Sverdlovsk to Magnitogorsk, and another from Novosibirsk to Kemrovo. The main line was used this year for freight only, while passengers were carried over part of the line only. The service between Moscow and Prague is expected to start in the Spring. In 1936 most of the routes, which will be equipped with wireless and lighting, will be covered by all-metal Stal-3 machines.

The rate of development of civil aviation in the Soviet Union may be seen from the fact that, while in 1923 the air lines extended over a distance of 250 miles and carried 229 passengers, with about two tons of mail and freight, the length of the Soviet air lines now is second only to the United States. About 100,000 passengers were carried last year.

Faster Pan-American Electras

ACCORDING to a report from the Lockheed Company, flight tests have revealed that a batch of three new Electra monoplanes for Pan-American Airways, Inc., are the fastest cruising twin-engined machines in America.

The new model is known as the Electra 10 E., and is powered by two Pratt and Whitney Wasp Senior S3H1 radials giving 550 h.p. at 2,000 r.p.m. for take-off, and 412 h.p. at 1,950 r.p.m. for cruising. Using 450 h.p. at 10,500 ft, the new Electra does 215 m.p.h. It will cruise at 205 m.p.h. at 9,600 ft. with each engine developing 412 h.p.

Pan-American Airways will use the new machines to augment their present services in Alaska, Cuba and Mexico. They carry ten passengers, two pilots, a maximum of 250 gallons of fuel, 420 lb. of mail, baggage and express matter. With such a load the take-off occupies thirteen seconds, and the run is 750 ft. Initial rate of climb is given as 1,200 ft./min. On one engine and with full load the new model maintains level flight and climbs to 9,000 ft. The new type of Lockheed fast-retracting undercarriage, the wheels of which can be raised in 7½ seconds, is incorporated. Western Electric radio equipment is installed, and the engines drive Hamilton constant-speed airscrews and are fitted with automatic mixture controls.

G.A.P.A.N. Officers

AT a meeting of the Guild of Air Pilots held on December 17, 1935, the following officers were appointed for the year 1935-36:—

Master, Capt. The Rt. Hon. F. E. Guest (unanimously re-elected); Deputy Master, Capt. A. G. Lamplugh (Capt. N. Macmillan retiring); Wardens, Messrs. N. W. G. Blackburn, P. W. S. Bulman, E. Fulford, J. Jeffs and A. S. Wilcockson; Treasurer, Major Norman Holden (re-elected); Assistant Treasurer, E. H. Lawford, Esq. (re-elected).

Christmas Records

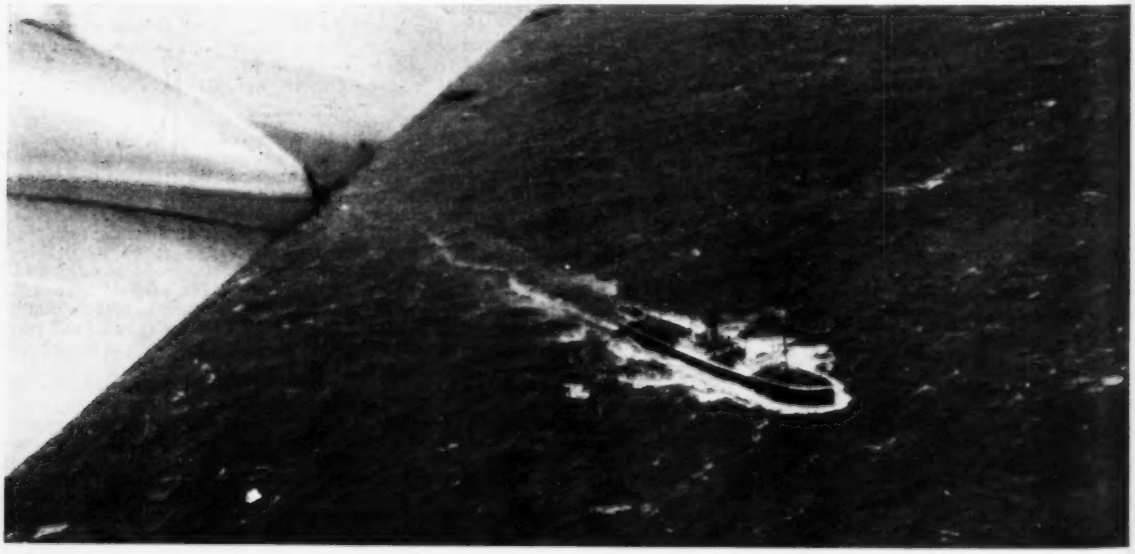
THE Christmas air mails despatched by the Imperial air services were the heaviest ever carried by air from this country. Those on the England-India-Australia service and the South African service weighed 17,572 lb., or about eight tons, as compared with 12,807 lb. for the corresponding Christmas despatches of 1934—an increase of 37 per cent. Stated in terms of the number of letters carried, this means that approximately half a million letters were included in the Empire Christmas air mails from this country. In addition, 2,357 lb. of parcels were carried, as compared with 2,208 lb. in the Christmas mails of 1934.

New Zealand's First Air Service

THE possibilities of commercial aviation in New Zealand are illustrated by the results achieved by East Coast Airways, which has operated a service for the past eight months between Gisborne and Napier.

Since the commencement in April and until November this company had maintained a 97½ per cent. regularity, had carried more than 2,000 passengers in addition to freight, and was proving increasingly popular. Returns covering the first six and a half months' activities show that the company's two machines made 706 trips out of 724 which had been scheduled. The cancellation of trips, however, was not entirely due to the weather, but was caused by the condition of the aerodrome at Napier. Throughout the period there has been an average load of three persons per flight. The inadequate ground facilities at the Gisborne end have restricted the load, except under favourable conditions, to four passengers, whereas the D.H. Dragons are, of course, designed to carry seven.

An encouraging feature of the service is that the traffic offering has shown a steady increase. Already heavy bookings have been made for well into the New Year. The possibilities of extending the service, perhaps to Auckland, has already received the consideration of the directors of the company, but developments in this direction are dependent upon an improvement to the existing ground facilities at Gisborne and Napier.



HIGH AND DRY: While the Jersey-bound D.H.86 flies serenely on its way, a Dutch freighter makes heavy weather in the Channel. A picture taken last week by a member of the staff of *Flight*.

A FINE FRENCH FLIGHT

Paris to Madagascar in 57½ Hours : Previous Record Beaten by One Day and Six Hours

The Caudron *Simoun*. This is the machine which visited Lympne this summer, and is similar to that used on the Paris-Madagascar flight. Above is a sketch map of the route followed by Genin and Robert. Landings were made at Sirte and Juba.

THE possibility of dining in Paris on a Wednesday evening and lunching in Antananarivo (Madagascar) the following Saturday was demonstrated by two French pilots, Genin and Robert, just before the Christmas holidays. By their flight these two not only escaped the wretched weather with which we less fortunate beings had to put up at holiday time, but they seem to have won a substantial part of the French Air Ministry's prize for outstanding flights of this nature.

Using a Caudron *Simoun* monoplane, fitted with a 180 h.p. Renault six-cylinder-in-line air-cooled engine, Genin and Robert left le Bourget at 10 38 p.m. on Wednesday, December 18. Their first landing was made at Sirte, on the north coast of Africa, at 9.20 a.m. on December 19. After a stay of 50 minutes for refuelling, they set off again and reached Juba at 1.30 p m on December 20. Staying there for only three-quarters of an hour, they headed for Antananarivo, Madagascar, where they arrived at 8.10 a.m. (Greenwich time) on Saturday, December 21.

As the distance from le Bourget to Antananarivo is approximately 5,500 miles, the two French pilots averaged a speed of approximately 96 m.p.h., counting in the time spent on the ground and basing the speed on "lapsed time." On two previous occasions Genin and Robert had been compelled to abandon their attempt and turn back. This time they were certainly successful. In this connection it is worth recalling that the same two pilots already held the record for the Paris-Madagascar route, with a time of 3 days, 15 hours, 12 minutes. The latest flight thus clipped one day six hours off the previous record.

The Caudron *Simoun* is known to a good many people in this country from visits paid to Lympne meetings by Mr. and Mrs. Guy Hansez, the well-known Belgian amateur pilots. In fact, last August, Mr. Hansez won the Wakefield Cup race on his *Simoun* at an average speed of 177.5 m.p.h. The machine is a low-wing cantilever cabin monoplane with accommodation for pilot and three passengers and with ample luggage space. The 9½-litre Renault engine drives a Ratier variable-pitch airscrew.

Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in the list.

Jan. 6. R.Ae.S. Lecture: "Sir George Cayley," by Mr. J. E. Hodgson. Institution of Electrical Engineers, 6.30 p.m.
Jan. 14. Irish Aero Club: Annual Dance, Gresham Hotel, Dublin.
Jan. 16. R.Ae.S. (Coventry Section) Lecture: "Development in Centrifugally Cast Piston Rings for Modern Aero Engines," by Mr. P. R. Twigger, 8 p.m., Armstrong Siddeley Canteen.
Jan. 20. R.Ae.S. Lecture: "The Theory of Alloy Structures," by Prof. W. L. Bragg. Institution of Electrical Engineers, 6.30 p.m.
Jan. 22. Royal United Service Institution Lecture: "The Expansion of the Royal Air Force," by Air Marshal Sir C. L. N. Newall, at 3 p.m.
Jan. 22. Civil Aviation Service Corps, No. 1 (London) Sqn. Dance, the Horns, Kennington, 8.30 p.m.
Jan. 30 and 31. Aerodrome Owners' Association: Annual Conference and Aerodrome Equipment Exhibition, British Industries House, Marble Arch, London.
Feb. 3. R.Ae.S. Lecture: "Airscrew Development" by Dr. H. C. Watts. Institution of Electrical Engineers, 6.30 p.m.
Feb. 12. Yorkshire Aviation Services Country Club: Dinner and Dance, 8 p.m., Grand Hotel, Harrogate.
Feb. 17. R.Ae.S. Lecture: "The Boundary Layer," by Prof. L. Bairstow. Institution of Electrical Engineers, 6.30 p.m.
Feb. 20. R.Ae.S. (Coventry Section) Lecture: "Variable-pitch Propeller," by Mr. T. E. Beacham, 8 p.m., Armstrong Siddeley Canteen.
Feb. 28. Bristol and Wessex Aeroplane Club: Annual Aviation Ball.
Mar. 10. Royal United Service Institution Lecture: "The Development of Civil Aviation" by Lt. Col. F. C. Shelmerdine, at 3 p m.
Mar. 19. R.Ae.S. (Coventry Section) Lecture: "Type-Testing an Aircraft" by Flt. Lt. Bulman, 8 p.m., Armstrong Siddeley Canteen.
Mar. 23. R.Ae.S. Lecture: "Welding," by R. H. Dobson Institution of Electrical Engineers, 6.30 p.m.
Mar. 26-29. Yorkshire Gliding Club: Members' Meeting.
April 16. R.Ae.S. (Coventry Section) Lecture: "Aircraft Instruments," by Mr. J. E. Chorlton, 8 p.m., Armstrong Siddeley Canteen.
April 20. "New Light on Strength of Materials Afforded by Modern Physics," by Dr. H. J. Gough. Institution of Electrical Engineers, 6.30 p.m.
May 15-18. Yorkshire Gliding Club: Open Meeting and Competitions.
May 15.-June 1. Stockholm Aero Show.
June 6. R.A.F. Flying Club: Annual Display.
June 20. Brooklands Flying Club: "At Home."
August 1-2. Yorkshire Gliding Club: Open Meeting.
August 15-30. Yorkshire Gliding Club: Open Meeting and Competitions.

Correspondence

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

THE AUTOGIRO AND SAFETY

[3100]—In reply to Mr. Holmes' letter about my previous Autogiro remark, I never suggested or even hinted that the type was unsafe, because it is obvious to everyone that it is about the safest machine anyone could use. The most efficient machine is the one that carries a given weight at a given speed on the least power on condition that the landing speed and take-off climbs are reasonable.

Judging by general performance figures, it seems to take about twice the power to cruise at, say, 100 m.p.h. with rotary blades, and this accounts for the fact that operating companies and the majority of private owners cannot entertain them. I should imagine that if wings were reduced to get a better top speed it would have difficulty in rising and climbing.

If only its flying qualities were as sound as its landing qualities there would be nothing to touch it, but if you read the correspondence to which I replied I think you will agree that we were talking about getting into the air, and not coming down. Safety is a very valuable characteristic, but it usually has to be paid for by performance, and it is easy to forget that a good take-off is as valuable in this respect as a low landing speed.

Most *Pou* builders seem to be making this latter mistake, for engines of 1,000 c.c. are about the minimum that can be used with security in this respect. P. PRIEST.

Huddersfield.

[3101]—I should like to know what Mr. Priest takes into consideration when talking about the efficiency of an aeroplane. If he solely regards top speed and payload, the Autogiro may be slightly inferior to orthodox aircraft. However, when one thinks of the speed range, which no other type can approach, the take-off and landing runs, the angle of climb, and the fact that you cannot stall, you begin to regard the 2 or 3 m.p.h. and 100lb. loss in speed and payload as very little price to pay for the advantages gained. If Mr. Priest likes investigating the relative efficiency of aeroplanes, I would like to point out that the first Autogiro flew in 1923, and I suggest that he compares the C.30A. with a similar type of aeroplane of the 1915 vintage. JAMES BUCHANAN.

Hatfield.

PLOUGHSHARES INTO SWORDS

[3102]—Some pacifists have claimed that as it is possible to fit bomb racks to commercial aeroplanes such machines are destructive agents in disguise. Those in the aircraft industry, however, argue that a military machine is highly specialised, and that commercial machines cannot be easily converted into bombers. Such are the views expressed in *Flight* of December 5.

Mr. W. W. Wakefield, in his speech in the House of Commons, definitely suggested that the machines and personnel of air lines could be used for counter attack in case of war: "The nation which has not neglected the air for commercial and social ends, which has its air liners and trained pilots and skilled mechanics, will never appear to be a defenceless and easy prey to the military aircraft of other countries."

Like motor vehicles on the ground, all aeroplanes could be used for war communications and transport, but it is the question of bombing which is most important to the public.

Commercial designs which sacrifice performance for safety and comfort would be unsuitable for day or night bombing. Factors which reduce possible military efficiency are: low landing speed, ability to maintain height with one or two engines not running, special arrangement of interior, and shape of wings to provide passengers with a clear view, etc.

Many machines for high-speed passenger service, mails and freight are not designed with such objects in view; these aeroplanes can be converted into efficient bombers. Examples are: D.H.89 air liner, converted for military purposes in R.A.F. and for Spain; Avro 652 commercial, in production for R.A.F. as 652A.; Bristol 142, originally commercial, now available in military version. Among large machines the three-engined Calcutta has been used in the R.A.F. and by Imperial Airways.

Germany possesses large Junkers three-engined machines with a wide field of defensive fire and a general appearance closely resembling the commercial Junkers. These machines appear to be intended for night bombing.

It would be interesting to have readers' views.

Birmingham. M. H. F. WILKINS.

OUT OF THE PAST

[3103]—The four-cylinder J.A.P. air-cooled engine referred to in the Correspondence columns of *Flight* of December 19 by Mr. L. Gwynne was produced in 1910 and was fitted to a Blériot monoplane by my old friend Graham Gilmour. Later—towards the middle of 1910—he fitted an eight-cylinder J.A.P. engine. Unfortunately he crashed with this machine and was killed. He frequently flew on this machine with W. R. B. Moorhouse, who won the first V.C. for the Royal Flying Corps during the war.

Gilmour did most of the constructional and fitting work himself, and flew at exhibitions all over the country, and would have made a wonderful pilot had he lived.

Coventry. ERIC W. WALFORD.

IN BRIEF

Discussing possible causes of the disappearance of Sir Charles Kingsford Smith, The Aero Stores, of Karachi, India, state that many air route maps in use in India are out of date, important landmarks, such as the newer railways, having been omitted. They state that, with the assistance of railway companies, and through other channels, they have been able to bring their own maps completely up to date.

GAIETY OF NATIONS: Pilots of the Abyssinian Air Force in company with the Emperor.

MODELS

Autogiro Problems : Progress in Petrol Power Units

By M. R. KNIGHT

A Successful Autogiro

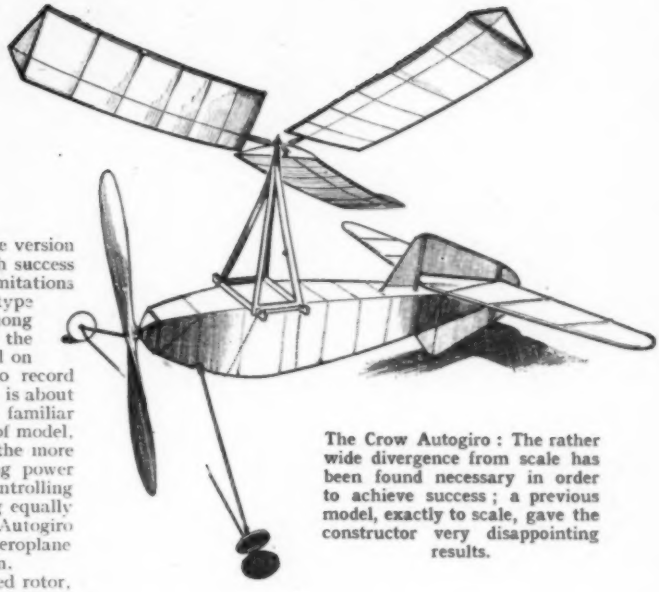
ALTHOUGH a model Autogiro flew before a full-scale version did so, and, in fact, indicated the line along which success was to be obtained, the attendant difficulties and limitations have, until comparatively recently, resulted in the type being neglected by the model-maker. Foremost among the experimenters now at work is Mr. S. R. Crow, of the Blackheath Model Flying Club. His model, illustrated on this page, holds the British hand-launched Autogiro record with a flight of 37 sec. The average duration, however, is about 20 sec. Modest as these figures may sound to those familiar with the capabilities of the lightweight duration class of model, they represent a very real achievement. Even with the more orthodox type of model, such factors as the varying power output of the rubber motor, and the absence of a controlling hand during flight, complicate the problem of securing equally satisfactory power flight and natural glide. The Autogiro presents all the limitations of the ordinary model aeroplane in the highest degree, plus the problem of autorotation.

As will be seen, the Crow Autogiro has a three-bladed rotor, and is wingless. It is a lightweight, constructed almost entirely of hard balsa wood, and covered with the thinnest of jap tissue, clear doped.

The rotor differs from that of the full-scale machine in several ways. Very wide blades are used, their mid-spars of birch terminating in simple wire attachments to the rotor hub, and the flexibility of the structure being relied upon for such variations in blade incidence and coning as are entailed by sustained, stable flight. The rotor axis is tilted rearwards at a greater angle than in full-scale practice, and the blades are mounted at an angle *negative* to the axis. The rotor pylon is built up out of 0.75 mm. three-ply, and can be slid along the fuselage, to which it is attached by thin rubber strip. This facilitates trimming, and is still more valuable as a shock-absorbing device. The lateral tilt necessary to offset rotor torque can be increased or decreased by varying the amount of packing beneath the base of the pylon. The blades have leading- and trailing-edge spars of balsa and balsa ribs, which are set farther apart towards the tips. The airscrew is given a considerable degree of down-thrust. The tail-plane lacks the upturned tips of the full scale machine.

Normally the rotor revolves when the model is held level, facing the wind, but on a calm day, or indoors, the "pilot" walks forward until rotation is secured. In R.O.G. flights the blades commence to rotate as the model moves forward.

The main dimensions are as follows: rotor blade span, 7½in.; chord, 2½in.; height of pylon above fuselage, 3½in.; height of fin above fuselage, 1¾in.; tail plane span, 12½in.; chord, 4½in. to 2¾in.; fuselage length, 15¾in.; wheelbase, 12in.; airscrew diameter, 9in.: pitch, 9in.; maximum blade width, 1in.



The Crow Autogiro : The rather wide divergence from scale has been found necessary in order to achieve success ; a previous model, exactly to scale, gave the constructor very disappointing results.

Petrol Power Progress

CONSIDERABLE interest having been expressed in the Willis monoplane described in *Flight* of November 7, a brief outline of the progress of the petrol-engined model in this country will perhaps be welcomed.

It will be news to many that a successful petrol model was produced as far back as 1908—by Mr. D. Stanger. In April, 1914, he established a rise-off-ground record of 51 seconds with a Canard biplane weighing 10¾lb., and powered by a 60 c.c. vee-twin-cylinder four-stroke weighing 2lb. 12oz. This engine is still in existence, though out of commission, and Mr. Stanger is still a member of one of our foremost model clubs. His record remained unchallenged for eighteen years, due to the War, the post-war slump in model aviation, and, doubtless, the inconveniently large size (and expense) of model necessitated by the heavy engines of the period.

In May, 1932, Capt. C. E. Bowden raised the record to 71 seconds with his tractor biplane *Kanga*. This model had heavily staggered cantilever wings and was fitted with a modified model boat engine, a Wall single-cylinder 28 c.c. four-stroke. This versatile enthusiast seems to have been the prime mover in the revival of the petrol model, and in securing the production of the really small and reliable I.C. engine which has led to the present popularity of the petrol model. He induced Mr. E. T. Westbury to design the first of the modern engines, the 15 c.c. Atom Minor two-stroke, which was eventually modified and put into production by A. E. Jones, Ltd.

With *Blue Dragon*, a 6ft. span high-wing monoplane with a sharply tapered wing and fitted with an Atom Minor engine, Capt. Bowden established the present R.O.G. record of 12 min. 48 sec. The 6½lb. model took off from Fairey's Aerodrome after a run of about four feet, climbed steeply in a spiral and disappeared in cumulus cloud at about 2,000ft. It was found undamaged on a farm ten miles away.

Capt. Bowden's successful petrol models have included biplanes, high-wing and low-wing monoplanes, an Autogiro, and a flying boat.

An inverted Atom Minor is also the power unit in the Willis monoplane, the present holder of the Sir John Shelley cup for power models.

Mr. J. W. Bishop's 10ft. span biplane *Endeavour* (30 c.c. two-stroke), the outstanding features of which are slow, steady flight and exemplary landings, flies consistently and often.

Even scale modellists have succumbed to the attraction of the petrol engine. Mr. Bishop's initial effort was a Comper Swift which, during its short and gay life, flew in interceptor fashion. More sedate is the 5ft-span Moth *Corsicanfly*, built by Messrs. J. H. Collings, R. Bennett and J. A. Andrews, with which numerous flights have been obtained. The weight is 6½lb. The 15 c.c. two-stroke engine was designed and constructed by Mr. Andrews. Both these models correspond very closely with the prototypes in the matter of main proportions, the difficulties being less serious than in the case of rubber-driven scale models.

A spectacular flight was made last July by a high-wing monoplane fitted with a Comet 18 c.c. two-stroke, both the work of Mr. A. E. Brooks, of Leicester. The model, which was of 6ft. span and weighed 8½lb., took off from a meeting of the Bournemouth Model Aircraft Society, at Cranborne, North Dorset, and in a few minutes was out of sight. Next day the crew of a coasting steamer retrieved it from the sea off Cowes, 35 miles away!

S.M.A.E. Annual General Meeting

THE annual general meeting of the Society of Model Aeronautical Engineers (the body appointed by the Royal Aero Club to govern model aeronautics in Great Britain) will be held in the drawing-room of the Y.M.C.A., Tottenham Court Road, W.C.1, on January 16, at 7.30 p.m. All who are eligible to attend are urged to do so, as a reorganisation scheme, which may have a far-reaching effect, is to be voted upon.

THE INDUSTRY

Industrial Revival : Lighting Accessories for Aerodromes and Aircraft : Company News

Aircraft Distributors Move

AS from January 1, the office staff of Aircraft Distributors, Ltd., has been transferred from Hanworth to the Company's aerodrome at Skegness, Lincolnshire.

Notable Flights at a Glance

THE more notable long-distance flights are recorded in tabular form and indicated clearly on a map issued by Air Centre, Room 10, 6th Floor, Colonial Mutual Building, 14, Martin Place, Sydney, Australia. The price is 1s. 6d., or 2s. 6d. varnished.

About Benzole

SOME useful information about benzole fuel for aeroplanes and cars is contained in a well-illustrated booklet, "The Triumph of National Benzole," which readers of *Flight* may obtain on application to The National Benzole Co., Ltd., Wellington House, Buckingham Gate, London, S.W.1.

Steelworks Reopened

YET another indication of the industrial revival is the news that the English Steel Corporation, Ltd., has reopened the works of its subsidiary company, The Darlington Forge, Ltd., whose name was for many years associated with heavy constructional and shipbuilding steelwork.

A Useful Spotlight

A LIGHTING accessory which should have more than one use on aerodromes is the Davis long-range floodlight, which is designed to give a narrow-angle beam of great intensity. It is already widely used for such purposes as illuminating clocks on factories and public buildings. The lamp employed is not of the expensive special focus type, and is therefore cheap to replace. Full details are obtainable from Davis Bros., Illuminating Engineers, Ltd., 36, St. Martin's Court, Charing Cross Road, London, W.C.2.

Fog Filters for Landing Lights

KNOWN as "Nebulite," a new type of fog filter glass is said to have advantages which render it particularly suitable for aircraft landing lights. Working on an optical principle, quite different from that of ordinary yellow fog filters, it throws irregularities in the ground into strong relief.

It is stated that K.L.M. have carried out various tests with "Nebulite" glass, and are now employing it in leading-edge landing lights. Full details are obtainable from the The London Motor Accessories Co., 19, Charing Cross Road, London, W.C.2.

Mr. V. S. Gaunt

IT is announced that Mr. V. S. Gaunt, M.I.Ae.E., A.M.I.P.E., has resigned his position as experimental engineer with Westland Aircraft, Ltd., in order to take up an appointment with the Supermarine Aviation Works (Vickers), Ltd., as manager of their Hythe works.

Before leaving the Westland works, Mr. Gaunt was the recipient of presentations from the firm and from the Westland branch of the R.Ae.S. Capt. Acland referred to the valuable work which Mr. Gaunt had carried out during the past ten years, and mentioned that the Westland branch of the R.Ae.S. owed its inception to his enthusiasm.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

C. W. A. SCOTT'S FLYING DISPLAY LTD. was registered as a private company on December 20, with a nominal capital of £2,500 in £1 shares. Objects: To organise and hold aviation displays etc., and to enter into an agreement between National Aviation Displays, Ltd., Sir Alan Cobham, Chas. W. A. Scott, Percival Phillips, John Leggitt Hugh V. Black and Thomas A. Pawlyn for the sale to the company of the business of National Aviation Displays, Ltd., together with the goodwill and assets and certain other property. First directors to be appointed by the subscribers. Solicitors: Underwood, Piper and Heys-Jones, 12/13, Holles St., Cavendish St., London W.1.

Mr. J. C. C. Taylor, one of the aviation representatives of Shell-Mex and B.P. Ltd. in the cabin of the new Hornet Moth of which the company has recently taken delivery.

INCREASED CAPITAL

STRAIGHT CORPORATION, LTD. (Investment, etc. Brettenham House, Lancaster Place, Strand, London, W.C.2.).—The nominal capital has been increased by the addition of £45,000 beyond the registered capital of £5,000. The additional capital is divided into 45,000 "A" ordinary shares of £1. The directors are: Whitney W. Straight (American) and F. A. S. Gwatkin (British). On May 2, 1935, W. W. Straight was stated to be a director of General Aircraft, Ltd. Whitney Straight, Ltd., Dumium, Ltd., Air Commerce, Ltd., Alarcal, Ltd., and Sidcot Trust, Ltd.

CELLON LTD. (86/88, Queen Victoria Street, London, E.C.4.)—The nominal capital has been increased by the addition of £85,000 beyond the registered capital of £85,000. The additional capital is divided into 65,000 6 per cent. cumulative preference shares of £1 and 80,000 ordinary shares of 5s. each. The 60,000 ordinary shares of £1 in the original capital have been sub-divided into 240,000 ordinary shares of 5s. The company has now been converted into a public one.

BRITISH CONTINENTAL AIRWAYS LTD. (Airport of London, Croydon, Surrey).—The nominal capital has been increased by the addition of £300,000 beyond the registered capital of £50,000. The additional capital is divided into 1,200,000 ordinary shares of 5s. This company was registered on April 15, 1935, and converted into a public one on October 31. The directors at December 11, 1935, were Sir Percy G. Mackinnon, Sir Robert B. Chadwick, Bt., Graham Mackinnon, Fdk. W. Jones and John R. Bryans.

PUBLICATIONS, ETC., RECEIVED

Flying for 1936. *The Official Junior Aircraft Year Book.* Price $1.50. Aeronautical Chamber of Commerce of America, 30, Rockefeller Plaza, New York City.

Junkers and World Aviation, by Capt. F. A. Fischer V. Poturzyn. W. H. Smith and Son, Ltd., Strand House, Portugal Street, London, W.C.2.

Technical Publications of the International Tin Research and Development Council, No. 28: The Mechanical Properties of Tin-Base Alloys, by D. J. Macnaughtan and Prof. B. P. Haigh. Free copies from Manfield House, 378, Strand, London, W.C.2.

The Hawk (December issue of Journal of the Royal Air Force Staff College). Price 3s.

Air Ministry Report on the Health of the Royal Air Force for the year 1934. Price 1s. 6d. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

National Advisory Committee for Aeronautics Reports: No. 507: Tests of Nacelle-Propeller Combinations in Various Positions with Reference to Wings. VI—Wings and Nacelles with Pusher Propeller, by D. H. Wood and C. Bioletti. Price 10 cents. No. 518: The Drag of Airplane Wheels, Wheel Fairings and Landing Gears. II—Non-retractable and Partly Retractable Landing Gears, by D. Biermann and W. H. Herrnstein, Jr. Price 10 cents. No. 520: A Comparison of Fuel Sprays from Several Types of Injection Nozzles, by D. W. Lee. Price 25 cents. No. 522: The Drag of Airplane Wheels, Wheel Fairings and Landing Gears—III, by W. H. Herrnstein Jr., and D. Biermann. Price 10 cents. No. 529: A Flight Investigation of the Spinning of the F4B-2 Biplane with Various Loads and Tail Surfaces, by N. F. Scudder and O. Seidman. Price 10 cents. No. 533: Distribution and Regularity of Injection from a Multicylinder Fuel-Injection Pump, by A. M. Rothrock and E. T. Marsh. Price 10 cents. No. 535: Hydrogen as an Auxiliary Fuel in Compression-Ignition Engines, by H. C. Gerrish and H. H. Foster. Price 10 cents. No. 536: Wind-Tunnel Tests of a 10-Foot Diameter Gyroplane Rotor, by J. B. Wheatley and C. Bioletti. Price 5 cents. No. 537: Tests in the Variable-Density Wind Tunnel of Related Airfoils Having the Maximum Camber Unusually Far Forward, by E. N. Jacobs and R. M. Pinkerton. Price 5 cents. No. 538: Altitude-Pressure Tables Based on the United States Standard Atmosphere, by W. G. Brombacher. Price 5 cents. No. 539: Investigation of Full-Scale Split Trailing-Edge Wing Flaps with Various Chords and Hinge Locations. Price 10 cents. Superintendent of Documents, Washington, D.C., U.S.A.

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